Hank,

Well now that I have had a chance to look around I think it will be best if I just read what is in the directory and then ask questions after I have a chance to digest the info... looks like my favorite protocol is the defacto standard the community is moving toward.

We have just moved the SRI machines to TCP as of tonight and it was my belief it should be the obvious choice for an Amateur protocol.

I will look forward to meeting you and eventually getting on the air via packets.

Thanks for providing this forum resource, it is a big win!

de N6HRN, Scott M. Hinnrichs

hank,

Alan Larson gave me the info to log in and leave mail for you. I attended the last Packet Radio meeting and have an interest in Amateur packet radio. Alan suggested I ask you for a mailbox on your machine as it is the local base for communicating info on the current happenings in packets. Since I am just getting into this I would appreciate any general info you might be able to point me to.

Thanks in advance for your help, Scott M. Himmrichs

N6HRN SMH@SRI-KL,SMH@SRI-AI,smh@sri-unix,...hplabs!sri-unix!smh

Hi Hank,
    First of all Happy New Year to you and yours, and may 1983 be a happy year.
    Second, I think that we should meet sometime after the first of the year to discuss the up-coming conference.
    Third, sorry that I tied up the DG packet port, but couldn't free it.... no matter how I tried.
    That's it for now. 82 was a very fun packet year.. 73 -cas-
)

To All Concerned:
RE: Previous Requests

I would like to thank you all for the response to my needs of various CP/M programs and to help N6GJH. Both areas have been covered. I would also like to thank you all for helping move packet radio into a a more substantial amateur reality. May you and yours have a very happy N E W Y E A R!!!!

73 and Very Best de N6ECT "Curtis"

TO: HM
FROM: DC
SENT: 29 DEC 82 21:36:42
READ: 29 DEC 82 22:01:07

by Lyle Johnson, WA7GXD

Everything was running on schedule. The Beta parts had all arrived within two or three days of deadline, the assembly facilities were busily stuffing the PC boards. All looked well.

Then a disturbing quality was noted on the PC boards. They weren't taking solder very well. A lot of rework was necessary, and when the rework was being done, the solderability problem got worse. By now it was 7 December, Pearl Harbor Day. It was agreed that the PC house would get us the first boards ASAP (they were all due on the 7th) so we could get rolling with testing.

More delays. More problems. More calls. The solderability of the boards was becoming a major production setback. The chief engineer at the PC fabrication facility was dispatched to one of the two assembly points (both were experiencing the same problems) to attempt to find the cause of, and hopefully a solution to, this problem.

Late Wednesday afternoon a batch of 19 Beta boards were delivered to the anxious checkout crew. Immediately Lyle, WA7GXD, and Pete, WB9FLW, (later joined by Den, KD2S and Dan KV7B) set to work on the boards. Test Number One was to apply power to the boards with no socketed ICs in place to ensure that the voltage regulators were working -- we didn't want to fry $150 worth of chips! All 19 boards passed with no problems.

The boards were then loaded with ICs along with some calibration/checkout software which was provided by Margaret, KV7D. The first board passed all tests with flying colors. The night passed. By 2:00 AM Thursday, December 9th, we knew we had a severe problem -- only three Beta boards out of fifteen tested were working!

Earlier, in November, Lyle had assembled a sample board provided by SLAPR, and it had worked perfectly. A second test board was hand assembled in November when the first production lot of Beta boards were shipped by the PC production facility. They had tested and calibrated with no problems.

After a brief, fitful rest, a meeting was held via telephone with Den KD2S, Lyle, WA7GXD, and Mark Baker, TAPR secretary and member of the Board of Directors. It was decided to temporarily halt Beta production and meet with the PC house.

This action was taken, and three TAPR executive officers hurried to the PC facility. After much discussion, a PC board was cross-sectioned and examined under a high-power magnifier.

The sight was sickening. A hairline crack encircled each plated-through hole near the pad on the solder-side of the Beta board. Further checks revealed the problem was a plague -- every board checked had the same problem.

This explained the solderability problem: abnormal heat transfer due to a break in thermal conductivity. It also explained the disastrous fallout rate of boards during testing. A few working boards were flexed, and experiments indicated that non-working boards could be made intermittently operational, while working boards could be made non-functional.

The problem was traced to a subcontractor to the PC house who had drilled the boards, and, for reasons of expediency, had also plated through the holes. The local PC house's work was not at fault.

A quick back-of-the-envelope calculation indicated that about $3600 worth of PC boards, $1400 worth of labor costs and $3600 worth of components would have to be scrapped -- a total of $8600!

TAPR does not have $8600. The Beta project is a non-profit activity, with perhaps a very few hundred dollars remaining for further R&D. The PC house agreed to immediately produce another set of boards -- at no additional charge -- and TAPR decided to attempt to mount a salvage operation to determine which components could be removed from the 119 boards that had already been soldered. The removed components would be subjected to a statistical sampling and analysis to weed out any potential reliability problems that might result from their use.

As a result, Friday night and all day Saturday various crews were assembled to unstuff, remove, categorize, test and otherwise process the Beta boards. The participants in this heart-breaking task consisted of: Lyle, WA7GXD, Pete, WB9FLW (who had flown in from St. Louis just to help in the big push to deliver Beta), Den, KD2S, Chuck, NOADI, John, WB7CKY and Dan, KV7B.

The bottom line is that TAPR now has a shortfall of about $3000 to get the Beta project out. New boards will be ready during the week of 28 December. It is hoped that populated boards will be delivered to TAPR around 10 January and we hope to ship by the 20th.

We appreciate your patience. We want these boards to be completely reliable. Meanwhile, the software group has more time to debug and enhance the initial Beta programming. A local area network will be established with a few boards that will be nursed along to help in the software effort.

While we are all disturbed by this delay, we are determined to complete development of the Beta boards and get them into the hands of the Packet Radio community as soon as possible. Maximum use of the delay will be made for software enhancement and testing, as well as initial hardware "beta testing". We think you will be very pleased with what you receive in January.

TO: HM
FROM: DC
SENT: 29 DEC 82 21:43:01
READ: 29 DEC 82 22:04:28

Bibliography on Minimum Shift Keying

Den Connors KD2S

The Amateur Radio Service will be undergoing a transformation as personal computers bring the need for high-speed digital communications into the ham shack. The modems now heard on the air will be woefully inadequate to provide bandwidth-efficient data transmission. This has led a number of amateurs to look into synchronous modulation techniques, and in particular, minimum-shift keying (MSK).

MSK was first patented as a "Minimum-Shift Data Communication System" in March of 1961 by Melvin Doelz and Earl Heald of the Collins Radio Company. Known alternately as fast-frequency shift keying (FFSK) in the early literature, the technique provided the minimization of bandwidth the researchers were looking for, using simple frequency-shift keying. The price they paid was in the complexity of the synchronous demodulators.

MSK can be descibed alternately as frequency shift keying with a fixed modulation index of 0.5, or as phase-shift keying of a digital signal with Gaussian pre-shaping of the signal input to the modulator. This very cryptic non-explanation may be clarified by digging into the available literature.

General Articles -

There are several articles which can give a general overview of the technique. Pasupathy presented MSK in an easy-to-read format for the IEEE in [PAS79]. A more complete technical presentation was done by Rudi De Buda [DEB72],[DEB74]. Morais and Feher [MOR79] introduce investigations of the effects of noise on MSK, and Gronemeyer and McBride fold in similarities of MSK and PSK in their 1976 article [GRO76].

[DEB72] R. DeBuda, "Coherent Demodulation of Frequency-Shift Keying with Low Deviation Ratio", IEEE Transactions on Communications, Vol. COM-20, No. 6, pp. 429-35, June 1972

[DEB74] R. DeBuda, "About Optimal Properties of Fast Frequency-Shift Keying", IEEE Transactions on Communications, Vol. COM-22, No. 10, pp. 1726-7, October 1974

[MOR79] D. Morais & K. Feher, "Bandwidth Efficiency and Probability of Error Performance of

MSK and Offset QPSK Systems", IEEE Transactions on Communications, Vol. COM-27, No. 12, pp. 1794-1801, December 1979

[GRO76] S. Gronemeyer & A. McBride, "MSK and Offset QPSK Modulation", IEEE Transactions on Communication, Vol. COM-24, No. 8, August 1976

[PAS79] S. Pasupathy, "Minimum Shift Keying: A Spectrally Efficient Modulation", IEEE Communications Magazine, Vol. 17, No. 4, pp. 14-22, July 1979

Comparisons with Other Techniques -

There are several articles which compare MSK and other modulation techniques, with special emphasis on useable signal-to-noise ratios and required bandwidth. The canonical paper is by John Oetting [OET79], who compares ALL known modes, and provides a bonus of a extensive bibliography on all of the techniques. Feher and his group have looked at the problem of use on satellites in [LEN82]. A few other pertinent comparisons are included here.

[HIR81] W. Hirt & S. Pasupathy, "Suboptimal Reception of Binary CPSK Signals", IEE PROC., Vol. 128, Pt. F, No. 3, pp. 125-34, June 1981

[LEN82] T. Le-Nsoc, K. Ferer & H. Pham Van, "New Modulation Techniques for Low-Cost Power and Bandwidth Efficient Satellite Earth Stations", IEEE Transactions on Communications, Vol. COM-30, No. 1, January 1982

[MIL81] L. Milstein, D. Shilling & R. Pickholtz, "Comparison of Performance of 16-ary QASK and MSK Over a Frequency Selective Rician Fading Channel", IEEE Transactions on Communications, Vol. COM-29, No. 11, November 1981

[OET79] J. Oetting, "A Comparison of Modulation Techniques for Digital Radio", IEEE Transactions on Communications, Vol. COM-27, No. 12, pp. 1752-62, December 1979

[TEY79] W. Tey & T. TJhung, "Characteristics of Manchester-Coded FSK", IEEE Transactions on Communications, Vol. COM-27, No. 1, pp. 209-16, January 1979

Filtering -

The utility of MSK has been shown to improve with adequate pre-filtering of the input signal. Morais and Feher [MOR80] give an excellent overview of the effects of filtering and limiting. [BAY79] and [RAB78] discuss bandwidth shaping, and [MUR81] and [SUZ81] explore the use of Gaussian filtering.

[BAY79] J. Bayless & R. Pedersen, "Efficient Pulse Shaping Using MSK or PSK Modulation", IEEE Transactions on Communications, Vol. COM-27, No. 6, June 1979

[MOR80] D. Morais & K. Ferer, "The Effects of Filtering and Limiting on the Performance of QPSK, Offset QPSK, and MSK Systems", IEEE Transactions on Communications, Vol. COM-28, No. 12, December 1980

[MUR81] K. Murota & K. Hirade, "GMSK Modulation for Digital Mobile Radio Telephony", IEEE Transactions on Communications, Vol. COM-29, No. 7, pp. 1044-50, July 1981

[RAB78] M. Rabzel & S. Pasupathy, "Spectral Shaping in Minimum Shift Keying (MSK)-Type Signals", IEEE Transactions on Communication, Vol. COM-26, No. 1, pp. 189-95, January 1978

[SUZ81] H. Suzuki, "Optimum Gaussian Filter for Differential Detection of MSK", IEEE Transactions on Communication, Vol. COM-29, No. 6, June 1981

Implementation -

Although the best implementation discussions are found in proprietary technical manuals of systems built by several corporations, a few articles do describe some details of construction. [AMO78], [CRU78] and [MAT78] present some practical hardware notes. Masamura et al. [MAS79] show a different technique using differential detection, which needs a higher signal-to-noise ratio to work as well as straight MSK synchronous detection. This differential technique has the benefit of providing error correction, however, and could be used in a number of weak-signal or fading situations.

[AMO77] F. Amoroso & J. Kivett, "Simplified MSK Signalling Technique", IEEE Transactions on Communications, Vol. COM-25, No. 4, pp. 433-41, April 1977

[CRU78] J. Cruz & R. Simpson, "Minimum-Shift-Keying Signal Detection with Noisy Reference Signals", IEEE Transactions on Communications, Vol. COM-26, No. 6, pp. 896-902, June 1978

[MAS79] T. Masamura, S. SameJima, Y. Morihiro & H. Fuketa, "Differential Detection of MSK with Nonredundant Error Correction", IEEE Transactions on Communication, Vol. COM-27, No. 6, pp. 912-18, June 1979

[MAT78] R. Matyas, "Effect of Noisy Phase References on Coherent Detection of FFSK Signals", IEEE Transactions on Communications, Vol. COM-26, No. 6, pp. 807-15, June 1978

[MORI79] Y. Morihiro, S. Nakajima & N. Furuya, "A 100 MBit/s Prototype MSK Modem for Satellite Communications", IEEE Transactions on Communications, Vol. COM-27, No. 10, pp. 1512-8, October 1979

This bibliography is by no means complete, and all of the articles mentioned above will lead the reader to more specialized papers.

TO: HM
FROM: DC
SENT: 28 DEC 82 06:19:33
READ: 28 DEC 82 17:57:32

by Den Connors, KD2S PACSAT Project Manager

As experiments continue on ground-based packet radio local area networks, a new class of satellite is being considered to handle linking of both individual ground stations and local area networks. The PACket radio SATellite (PACSAT) system is designed to provide a store-and-forward digital repeater which is available to all groups around the world for fully global network coverage. The satellite provides this coverage by occupying a low-earth orbit (LEO), which has several benefits. The close proximity of passage, relative to geo-synchronous satellite, allows easy access, with good "link margins". There are thousands of amateur radio earth stations that are already configured to operate on this class of satellite. Additionally, proper choice of orbital parameters allows a sun-synchronous orbit, where passage of the satellite occurs at the same times each day, providing an easy means of scheduling transmissions. This orbit then provides both 100% global coverage and very fair access, and creates a powerful new use of a well-known class of amateur satellite.

There are several reasons for providing such a system in the Amateur Satellite Service. PACSAT will be a widely available vehicle for advanced amateur radio experimentation, as well as a prototype system for a new class of satellite service -- reliable transmission of data to remote sites and isolated users, regardless of location. It will also provide a new form of emergency communication -- a reliable, highly available link compatible with global mobile and portable radio service requirements. The PACSAT project will provide AMSAT with a new supply of engineering talent and expertise, fresh sources of funding and new ranks of members.

In addition to the primary use as a world-wide store-and-forward link, or "flying mailbox", the PACSAT experiment will serve a number of other functions. These include real-time regional linkings in standard LEO amateur mode and versatile access using more traditional Amateur Radio digital modes. PACSAT will provide extended availability to users via ground stations with linkings to local area networks and an opportunity for advanced testing of network systems concepts, hardware software and protocols.

Although time constraints could prevent multiple modes being implemented in the first of the PACSAT systems, it is envisioned that such

techniques as Morse code (CW) , radio teletype (RTTY), and ASCII using audio frequency-shift keying modulation would all be possible. The satellite processor could accept such input, store the data in memory and later forward the messages in whatever mode the intended receiver would desire.

PACSAT System Description

The satellite will be an experimental package on one of several possible spacecraft. It would be in a full-earth coverage orbit with 2 to 4 passes per day appearing at the same time each day.

There will be two communications channels, each with multiple input signal capability and individually reconfigurable packet and non-packet modes. The multiple uplink frequencies will use frequency-selectable tracking phase-locked loops. The channels will be full duplex, with a data rate of 1200 bits/second.

The communications channels will use the standard mode B OSCAR configuration (435 MHz uplink, 145 MHz downlink). The satellite will be capable of frequency control of ground stations, and could also direct antenna pointing and predict orbit and pointing coordinates. Except for the modem and controller, hardware for ground stations is already available. The satellite may optionally use an LAN link for large group coverage.

The processor may use the AMSAT-standard 1802 configuration, or possibly high-reliability CMOS microprocessor. There will be a well-defined interface with the spacecraft Internal Housekeeping Unit. The main memory may be loaded from ground stations. There are up to 8 megabits of memory possible, using bubble memory or static CMOS. CMOS would be available in 16K or 64K packages. Bubble memory would require a custom MSI-level CMOS controller. Serial input and output to memory modules for data and addressing might be used. Modules not being addressed could be turned off.

Two modes will be available at any time -- synchronous or asynchronous packet, ASCII, RTTY or CW. Packet transmissions could use either phase-shift keying (PSK) or minimum-shift keying (MSK) modulation, or both.

Packet protocol will include a multiple-access common uplink frequency to be used as a "calling channel" and multiple uplink frequencies to be used for working channels.

Transmission collisions will be detected

through negative acknowledgement of missed or garbled messages. Frame protocol will use a high-level data-link control (HDLC), a synchronous bit-oriented protocol. Optional frame control sequences are specified in the AMSAT/AMICON Amateur International Computer Network system specifications (e.g., AX.25 level 2, TAPR/AMSAT). There will be opportunity for various experiments with higher-level protocols. A mailbox protocol with memory management and friendly, efficient user interface will be provided.

The primary use of PACSAT will be for store-on-uplink, forward-on-downlink full-earth coverage. Secondary uses will be for direct (real time) signal regeneration, including bulletin broadcasts, group transmissions, telemetry, and user reconfiguration of the secondary communication mode.

Volunteer Efforts for PACSAT

The PACSAT idea has been mulling around in the heads of several people. This design phase is due to end by mid February, when the need to keep on a two-year deadline will force the design groups to keep working.

Most of the ground station hardware design effort to date has been spread over several groups:

- Tucson Amateur Packet Radio (TAPR)
- Amateur Radio Research and Development Corp. (AMRAD)
- with further assistance from a strong AMSAT group in New Jersey

Ground-side linking systems are being developed by all of the above groups, as well as with AMSAT groups in New England, the Pacific Packet Radio Society (PPRS) and others.

A number of the above groups are also working on modem technology for the bandwidth-eficient packet channels required. There also exists a group up at the State Unniversity of New York at Stony Brook. The possible candidate for best memory technology are being investigated by AMSAT-related organizations in Canada and the U.S.

Problems associated with protocols, spacecraft operating systems, spacecraft-ground communication and ground operating protocols have been looked by almost all of the above groups. There are also groups in Los Angeles, St. Louis and in Lindkoping, Sweden.

Negotiations are underway to set up flight hardware design and fabrication, and groups in the

United Kingdom and South Africa might assist in efforts.

(reprinted from the APR Packt Status Registrer #3, December 1982)

Hi All:

I just spent the last three days helping N6GJH set his VADCG up. For the most part there were only a few mistakes with his work. As you can tell, since I am using his VADCG, that part works,,,,, but, I know nothing of TR-2500s' or the VADIC 202, and was not able to interface his modem & and radio to the VADCG. He has around 20 days of vacation left from school and would probably drive most anywhere in the bay area to set up on packet. N6GJH CCCCCCN6GJH CCCCCC

Please, if you have some spare time, and can help, give him a call at home at (415) 435-4891 or call me at (415) 552 3430 tnx and best

73 de n6ect, curtis

Hank,

Just read Paul's letter and -- great --!!!! Hope to get tosether soon to discuss the upcoming conference. 73

-cas-

Do you still have any of those 8250 chips for sale? If so, how much are they? I need 3 of them. Please drop me a note when you have the time.

Thanks, Rick N6GJH

TO: HM
FROM: PLR
SENT: 15 DEC 82 14:17:20
READ: 15 DEC 82 17:56:17

To : Hank Magnuski, KA6M
Subject: Release of Packet Conference Call for Papers

On December 14, I met with Dave Sumner, K1ZZ, ARRL General Manager, and obtained his oral approval of ARRL sponsorship of the second packet conference and to release a call for papers.

Below is what I plan to publish in the January AMRAD Newsletter which should go to the printer on December 17. I will also take care of sending it as a news release to amateur magazines and newsletters with national coverage and packet clubs other than the West Coast. You can go ahead with West Coast publicity.

NEWS RELEASE

Second ARRL Packet Conference Call for Papers

The ARRL is sponsoring a second Amateur Radio Computer Networking Conference on March 19, 1983 in San Francisco, CA. The conference will be in cooperation with the 8th West Coast Computer Faire being held March 18-20.

The deadline for camera-ready papers is February 5, 1983. All papers should be mailed to Paul L. Rinaldo, W4RI, 1524 Springvale Avenue, McLean, VA 22101. If you plan to speak, please request an author's guide and advise Paul of the title of your paper immediately. Proceedings for this conference will be separate from those for the Faire which had a deadline of November 30, 1982.

Technical papers are invited on all aspects of amateur packet radio, advanced radioteletype (RTTY) including AMTOR, and related Amateur Radio digital communications via hf, vhf/uhf and satellite media. Topics may include network and system architecture, proposed standards, hardware, software, protocols, modulation and encoding schemes, and applications. This is an excellent opportunity to have your ideas influence the future of amateur digital communications.

This event will be hosted by the Amateur Radio Research and Development Corporation (AMRAD) and the Pacific Packet Radio Society (PPRS). Making up the conference committee are:

Hank Magnuski, KA6M	- Coordination (PPRS)
Stu Neblett, K6VCO	- RTTY & Packet Demos
Bob Reiling, W6JHJ	- Faire Liaison
Paul Rinaldo, W4RI	- Coordination (AMRAD) Technical Papers
Curtis Spangler, N6ECT	- West Coast Publicity

END OF NEWS RELEASE

Concerning finances for the conference, everyone on the

committee should keep receipts for all reimbursable expenses which are directly in support of the conference. I suggest that act as focal point for to answer any PPRS committeemens' questions about what expenses are reasonable and proper. The lion's share of the expenses will be printing of the proceedings, and I will be responsible for that. For the first conference (and sales of proceedings afterwards), we charged $5 for the set of two volumes and lost a little money ($122.77 overall) which was reimbursed by the ARRL. A charge of $6 would have put the first conference in the black. A break-even figure for this one is probably around $7, assuming that we don't print proceedings that are eventually unsold. We printed 200 copies for the first conference. We ended up Xeroxing a couple dozen more for late, late requests. So, your figure of $9 for advance registration seems to be very safe, with about two dollars margin. It is reasonable to ask for one dollar more at the door (for incentive to pre-register) and for proceedings ordered by mail (to pay for envelope and postage). So, with that seat-of-the-pants financial forecasting, do you still feel that we should settle on your figures of $9 advance, $10 door/mail or can we lower both figures by a dollar? I think we should agree on the final figure as soon as possible because we will need to release pre-registration publicity very soon.

We also need to develop a sense of how many people will come and/or order proceedings by mail prior to printing deadline. I would guess that we're talking about 300, possibly more, this time.

73, Paul, W4RI

Hank,
I probably have copies of the messages that you deleted by accident and I will soon be able to tx (upload) you the current list. The only interesting thing that I had to offer was a copy of a new UNIX manual that is not in print yet and that you are welcome to borrow, and that you might want to give GNU a call to talk about the UNIX buss that you mentioned. He also has all the stuff to connect the USENET access. Are you going to send me the checks that you mentioned? 73,best
-cas-

FROM: Curtis, N6ECT
TO: CP/M Users
DATE: December 12, 1982

SUBJECT: XMODEM & BYE HELP

I am in need of two public domain programs to complete a packet project that I have been working on. They are XMODEM.ASM and BYE.ASM. If anyone could help, it would save some long distance phone calls.

The project consists of an Amateur Radio Bulletin Board with a control operator Link to Packet Radio. The bulletin board would have a mailbox, an area desisned for "beginning amateur radio", for those computerists entertaining the idea of getting a license, a general area for packet information, and a control operator Link to packet radio.

Perhaps if you have the spare time and the equipment and want to do some public relations for packet radio, you could try it too. It could be fun and maybe one day a week for a few hours and advertise on your local BBS..... just a thought anyway... 73, best N6ECT
-cas-

FROM: Curtis, N6ECT
TO: All Interested Packeteers
DATE: December 12, 1982

SUBJECT: Calls lossed on KA6M** Packet Central

There were 108 calls lossed on KA6M** Packet Central. 49 calls were made via packet radio and 59 calls were lossed via telephone. There were 13 active stations: WA6AZP, N6ECT, WB2GDQ, N6FQR, KA6NAN, W6JHJ, K6VCO, KD6LI, WA6JFZ, KA6M, KA1AS, N6GJH, and KA6ETJ.

73, -cas-
)

To: All
From: BRD (N6FQR)

I received the following request for amateur radio packet info via the Arpanet. I responded with some general information. If any of your know of any more specific information that I can forward to him, please let me know. Thanks.

Bill Danielson

Date: 1 December 1982 03:47-EST
From: Leslie J. French <LJF at MIT-MC>
Subject: SF Packet Radio
To: danielson at PARC-MAXC

Bill,

Yes, it IS the Amateur Radio network I'm interested in. We are interested in setting up something similar around where I live & to call in to a GEC (English, not American) computer where I work.
We would like to base it around one of the Ham Radio frequencies but we are not Amateur Radio experts (we do a lot of 'traditional' X25/HDLC type of stuff).

Does the SF Bay Area network have some sort of a 'Starter Pack' for people wanting to join?
Ideally with indications of suitable equipment for use in broadcasting - interfaces to vdus.
Also receiving equipment & the software needed.

Really, I am fishing around for information, the system obviously works in SF & I see no reason why it shouldn't work in the UK also; but you are the people with all the expertise, so can you help in any way??

Leslie.

(PS, If you want to try transatlantic mail, I am reachable as:
"LESLIE%RLGK%UCL-CS"@ISID
all the " % and @ signs in that are significant)

Hi Hank,
    Don't have much time now to chat, as I have just finished contract job.....and "pushed me body to the limits"... so am now able to return to the world of packet.
-cas-

To: Paul Rinaldo
From: Hank Magnuski
Date: 8 December 1982

Re: Faire

Thanks for sending the reprint of your article for the Faire. It was very well done and will no doubt be accepted. I also submitted a paper, a rewrite of the QEX article removing most of the AMSAT specific things and adding my new protocol notes.

In answer to some of your specific questions:

1. Bob Reiling felt that room space would be at a real premium, and that we should probably be grateful for the space we get. I thought 75 people would be about right, but might have underestimated. To get more room we would have to go elsewhere, which would be a disadvantage. We might be able to arrange external audio/video if required. There is a large hallway leading to the room.

2. The papers in the Faire Proceedings do not claim exclusive copyright, and there is nothing in the submittal form which would indicated that they couldn't be published elsewhere. When I spoke to Vondra, I asked her about publishing our own user group proceedings, and she didn't see an problem with that. So I don't see any difficulties in that area.

3. The Faire won't collect any extra money for us. We can purchase pre-registration tickets in bulk, and sell them along with the proceedings. The Faire tickets are $11, and we could charge maybe $20 for the combination Faire + ARRL Proceedings/Registration. Maybe $10 for the latter at the door. Anybody who's seriously interested in the conference will want the proceedings.

73, Hank

Date: 06 December 1981
To: All packet stations
From: Hank Magnuski, KA6M

Subject: Local Area Network Design Issues, 2nd Edition

The following is a random collection of requirements and design issues related to the construction of a local area network. Some of the ideas are very preliminary and some of the requirements may conflict with each other.

This is a set of notes and should not be taken as a well thought out discourse.

1. We must consider the situation where there are multiple repeaters on the same frequency with overlapping RF domains. Some stations may be able to access all, others just one. Duplex machines won't work (they can hear the users, but not each other due to mixup of in & outs). No interlinking on another band (such as 450) is assumed. The repeaters, links, and users are on the same channel. This is the worst case situation, but a realistic one.

2. No single Control Station should be "in charge" of the operation of the other repeaters. They all act as fairly independent entities.

3. Users stations ought to be able to move into an area and setup and start transmitting without any prearranged address assignment or placement on a polling list.

4. The long term solution will not depend on unique, permanent assignment of HDLC addresses to users. The callsign is the only item that is really important.

5. Users should have some control over which repeater they wish to access, and whether to use a repeater at all.

6. Direct connections between stations must be permitted.

7. Target stations (of a connect) should automatically adjust their output to return packets via the repeater/non-repeater path initiated by the connecting station.

8. If the connection is direct or through just one repeater, the protocol could be simplified and overhead bytes could be eliminated. The Internet Protocol (IP) header would not be needed.

9. If two or more repeaters are in the chain, IP headers will most likely be necessary, but possibly one could arrange a connection through a limited or well defined path without use of the IP header.

10. Repeaters should be available for status checks, loopback testing and diagnostics. Thus there will be packets or commands directed to the repeater which are intended for processing by the repeater.

11. Maybe a repeater should implement "please-repeat-me/don't-repeat-me" status bits for each user address available. Users should be able to selectively address or access each machine or network server. A "please-repeat-me" directed to one machine should be interpreted as "don't repeat-me" by other machines. For broadcast protocol purposes (round-tables, nets, etc.) one may wish to say "Will-everybody-please-repeat-me".

12. Repeaters will send "Repeater-ON" status message and current routing

information to other repeaters in the network. Repeater beacon messages inform users what machines are operational and their addresses.

13. Hop-by-hop error checking would provide satisfactory reliability for the proposed datagram implementation.

14. Static assignment of HDLC addresses would be ok for permanent stations like repeaters or other network servers.

15. No static assignment of addresses implies:
   a.) Dynamic assignment is required -or-
   b.) Use of IP headers is required everywhere

16. Dynamic assignment of addresses implies:
   a.) All servers covering one area are coordinated and don't assign the same address to different users.
   b.) Deassignment of addresses must be foolproof and implemented through user-initiated commands or through timeouts. No conditions should permit an address to "lock-up" to a non-existent or inactive station.
   c.) An Address needs to be defined for users who don't have an address to ask for an address. Probably 00 or FF, with FF most likely.

17. Use of IP headers implies:
   a.) More overhead per packet, approx. 30-40 bytes.
   b.) Only one HDLC address code is required for all users.
   c.) From and To callsigns will be in each packet.
   d.) From and To network node address will be in each packet.
   e.) Other useful info in header, such as protocol type field.
   f.) More overhead on the software, which will be receiving, storing, and checking packets not destined for its station.

18. Some block of HDLC addresses should be reserved for network usage and servers. Here is one proposal for assignments:

00	Maintenance or NOP address
01-7F	Direct connect for stations not using IP protocol headers
80	Reserved
80-EF	Repeater connection for stations not using IP protocol headers
F0-FD	Network repeaters, servers and gateways using IP headers
FE	User station common calling address, IP headers in use
FF	Broadcast, all-parties-addressed, no IP headers

Perhaps a block of addresses should be reserved for future use by another protocol, or for special cases, or for other currently unforseen emergencies.

19. If repeater with address F9 receives a packet from machine F1, it would look into its routing tables and find the next repeater which should receive the packet, say FC. It would put FC into the outgoing address, and retransmit the packet. Thus we utilize selective addressing and can aim the packet in the direction we want, based on our routing decision.

Selective addressing could also be implemented by using the "source route" option in the Internet Protocol. The repeater which is the initial link in the chain is listed as the first destination in the destination address field. The address(es) in the source route option will then replace the initial repeater's address and speed the packet on its way.

20. In addition to the address ranges, we have control over the type of packet sent as defined in the HDLC control field. What use should be made

of Non-Sequenced-Information (NSI) field packets (and other types)?

21. Protocol should allow host machines to simultaneously handle multiple connections with different users. Also, multiple independent streams, e.g., console I/O and printer I/O simultaneously, should be easily implemented.

22. What requirements do real-time broadcast protocols impose on the design?

23. Summary of various cases:

I. Direct	A -> B
II. Single Repeat	A -> R1 -> B or A -> Rn -> B
III. Double Repeat	A -> R1 -> R2 -> B
IV. Linking	A -> R1 -> R2 -> ... Rn ... -> B
V. Repeater Command	A -> R1 -> A
VI. Broadcast	A -> Rn -> B, C, D, E, ...

24. A repeater can be addressed in several different ways:

Use of its own callsign in an IP header
Use of its network node address in the IP header
Use of its own special F0-FD address.

25. Various classes of packets which a repeater will have to handle:

a.) IP packet with F0-FD address, "To" Node is repeater's.
b.) IP packet with F0-FD address, "To" Node is not repeater's.
c.) IP packet with F0-FD address, "To" Node & Call is repeater's.
d.) IP packet with FE address, "To" Node is not repeater's.
e.) IP packet with FE address, "To" Node is repeater's.
f.) IP packet with FE address, "To" Node & Call is repeater's.
g.) IP packet with FE address, "From" Node is repeater's.
h.) NSI packet, an F0-FD address, with command or control text.

The corresponding situations are these:

a.) Repeater is last or only link in a linked chain
b.) Repeater is a middle link in a linked chain
c.) Repeater itself is the final target of the packet
d.) Packet is for another server, unless case g below.
e.) Repeater is last or only link in a linked chain
f.) Repeater itself is the final target of the packet
g.) Repeater is a beginning link in a linked chain
h.) Repeater itself is the final target of the packet

The above list does not cover the non-IP header packets which might be in use by a local area net. It also assumes the "source route" option, mentioned in (19) above, is not in use.

26. For a station to automatically return a packet over the path on which it came, the following steps are necessary (IP protocol is assumed):

a.) Exchange source & destination node numbers
b.) Receive and transmit using standard FE calling address.

The repeater (or non-repeater) which delivered the packet will automatically pick it up and retrace the path.

The Internet Protocol also provides for a "return route" option in the header. It could be used on a connect packet to indicate the path to be used in responding.

27. Direct connect stations usins IP protocol can use "NET 00 00 00" as the network node address. NET is decimal 44.

Hank,

PLEASE ADD TO CURRENT PPRS MAILING LIST:

KA6ETJ, Christol
W6XN, Pronko

RE: PAUL'S REQUEST FOR MEDIA FORMAT:

I will probably be using the "standard media news release protocol" (chuckle), that I used during the last two presidential elections. I will send you a sample copy of my approach before the actual release. I will probably put a little extra effort into this one, as I think that the public/world should have a better understanding of the advantages of packet radio.

RE: WHAT'S HAPPENING IN MY LIFE:

Since the meeting, Ann and I have put in a lot of work hours, to the point where we are almost "frazzled"; so today has been set aside to relax and recoop. We are still trying to decide if it is a good idea to purchase the fishing license up in Alaska, that I mentioned, and the possibility of getting some more land in a few other states. I got another new computer, and have accepted a one month contract job with a marketing company. One of the possible rewards from doing this work is a Sun computer or a VAX 11/730, but that would mean signing a contract for a year, and I am not sure if I want that responsibility-----(seeing that the marketing company would probably try to squeeze as much out of me as possible, save my life breath (chuckle)).

Hope that you and yours had a nice Thankssiving. TTYL 73 & best

-ces-

TO: HM
FROM: PLR
SENT: 26 NOV 82 16:55:47
READ: 26 NOV 82 17:37:01

Hank:

Thank you for your Bulletin Nr. 1 on the packet conference. Your outline looks fine at this point in time. Also, lest I forget to say it, I very much appreciate the way you, Stu Neblett, Bob Reiling and Curtis Spangler have taken up the gauntlet.

I'll use it with the letter that I am writing today to Dave Sumner, K1ZZ to get League okay to sponsor the packet conference and on the expenditure of travel funds for the ARRL Digital Committee. I need to get a commitment from him fairly soon so we can start getting the call for papers out to all packeteers. I can easily handle getting the word out in the next QEX, AMRAD NL QST, The Packet, PSR, SLAPR Protocol, ASR, Westlink, W5YI, etc. I hope that you can slip something in The Faire Word, Homebrew Computer Club NL and other West Coast radio/computer club NLs. Anyway, when I get the go-ahead from Dave, I'll send you and others on PRNET a release that I would like to see printed in packet newsletters. Meanwhile, if N6ECT has some suggested language for the national news release, please send it to me. I may have questions when I get into wording the call for papers.

The speaker's kit arrived in the mail the other day. At this point with the deadline so quick, I'll try to prepare a paper by the deadline or call the people to get an extension on handing it in.

Terry Fox thinks that he can make it to the conference because he has some weeks of leave coming. I don't know how many others can be attracted from afar, but I'm sure that the Californians will more than fill Room 401. Is it big enough? If we overflow, is there anything that can be done to accommodate any more, such as expand into a next room, pipe video/audio someplace?

You didn't touch on this aspect, but I assume that it will be okay with the Faire if we publish our own proceedings under the ARRL banner, as last time. A finer point, is it okay with them for us to publish in our proceedings those packet papers (i.e., those by K6VCO, KA6M, W4RI) which will appear in the Faire Conference Proceedings?

About Faire pre/registration, do I read you correctly in assuming that we can get the Faire to collect the extra money for the packet conference proceedings? Preregistration only, or also at-the-door registration?

73, Paul, W4RI

Hank,

PLEASE REMOVE FROM "Distribution List for Packet Radio - California xx etc."

Berklemann, N6CNT (returned mail)
Corbitt, WB4FNE/6 (returned mail)
Gensle, (no call) (returned mail)
Kirk, WB6HLZ (returned mail)
Meyer, K6RTV (returned mail)
Buttschardt, W6HDO (by request)

PLEASE UPDATE

Berry, KA6ENK (Home: 209-223-0221) (Office: 209-223-1769)
Kawala, KA6STG (Kawala, N6GJH)
Murren, WA6QQZ (address: 904 W. Loquat Ct., Lompoc, CA 93436)

PLEASE ADD (can't remember if I sent you this one)

Harry S. Conlin, WD6DRQ
145 Curry Street, Richmond, CA 94801
Home: 415-233-0842

Current Pacific Packet Radio Society Mailing List November 20, 1982 -cas-

Conlin, WD6DRQ
Marquis, K6HSV
Walker, WA6QKN
Lodewyck, N6EE
Kaufman, WB6ECE
Kawala, N6GJH
Berry, KA6ENK
Masnuski, KA6M
Neblett, K6VCO
Reilins, W6JHJ
Teague, WA6TAT
Spangler, N6ECT
Hudson, W6EMX
Harris, (no call)
Oades, VE7CYD/6
Heward, K6EER
Danielson, N6FQR
Delp, KD6QG
Palmer, N6KL
Thorn, WB6PET
Gilmore, (no call)

When I set a chance, I will create a .doc file with the current mailing list and info. and on the next mailing include a copy of the list. This will be helpfull to those who do not yet have access to the DG. I thought that I misht also include a copy of the "how.to.use" doc., just in case there are those that do not know about the twisted pair. (comments requested).....by the way the list contains 21 people (includins us).... cul hv nice wkend ...am lookins fwd to ftball tmrw... 73, best u n urs -cas-

++++++++++ AMICON LINK LEVEL PROTOCOL NOTES ++++++++++

The protocol which forms the basis for the AMICON Link Level design is a subset of ADCCP-HDLC Level 2 protocol. In this protocol the standard unit of information is the frame:

SYNC	SYNC	FLAG	DC	SC	RC	CNTL	PID	TEXT	FCS1	FCS2	FLAG

where

SYNC	-	preframe synchronization, idle flags or zeroes
FLAG	-	start of frame, bit pattern 01111110
DC	-	destination callsign address field (6 chars + SSID)
SC	-	source callsign address field (6 chars + SSID)
RC	-	repeater callsign address field (optional)
CNTL	-	control byte, indicates type of frame, other info
PID	-	protocol ID byte for frames with text
TEXT	-	optional information field
FCS1	-	first byte of frame check sequence (CRC)
FCS2	-	second byte of frame check sequence
FLAG	-	closing flag

Callsign address fields are constructed in the following manner:

CHAR1 CHAR2 CHAR3 CHAR4 CHAR5 CHAR6 SSID

where each call is left justified in the field, padded with blanks, uppercase if possible, and each CHAR is shifted left so that the LSB is zero, except for the last byte of the address fields, where the LSB is set to one, indicating the end of HDLC extended addressing. The SSID byte is of the form

R 11 SSSS X

where R is the "repeated" bit, set to one only in the optional repeater addressing field when the packet has been repeated. The 11 field is reserved and set to ones. It may be used for control purposes if required by a local area net. The SSSS field is the sub-station code, normally all zeros except for situations where a person has more than one station on the air. The X is normally zero, unless this field is the last of the callsigns, in which case it is set to one, indicating the end of the variable length address field.

Other features used:

bit stuffing	-	provides fully transparent transmission of data
NRZI encode	-	Zeroes cause transition which allows clock recovery
multiframe	-	Up to seven frames permitted in a single transmission

Types of frames:

Unnumbered	-	Used for Link Control & Broadcast
Supervisory	-	Used for window & flow control
Information	-	Used for transmission of text

Unnumbered Frames:

FLAG DC SC RC CNTL PID TEXT FCS1 FCS2 FLAG

DC - Destination Call, target station for this packet
SC - Source Call, originating station for this packet
RC - Repeater Call, specifies repeater to be used (if any)

CNTL - 2FH = Initiates a Connect Request (SABM)
43H = Initiates a Disconnect Request (DISC)
63H = Acknowledges a Connect or Disconnect (UA)
0FH = Disconnected Mode Status Response (DM)
87H = Frame Reject Status Response (FRMR)
03H = Broadcast Information Packet (UI)

The Poll/Final (P/F) bit, 10H, is used to force a response from the receiving station. Used here and in other frame types for this function.

PID - Protocol ID for frames containing text (see I-Frames)

TEXT - Text field information, only for broadcast packets

Supervisory Frames:

FLAG DC SC RC CNTL FCS1 FCS2 FLAG

DC etc. - Address fields, as above

CNTL -

7	6	5	4	3	2	1	0	
Nr			P/F	0	0	0	1	Receive Ready
Nr			P/F	0	1	0	1	Rcv Not Ready
Nr			P/F	1	0	0	1	Reject

Nr = Sequence count of next expected I-frame
P/F = Poll/Final bit

Information Frames:

FLAG DC SC RC CNTL PID TEXT ... TEXT FCS1 FCS2 FLAG

DC etc. - Address fields, as above

CNTL -

7	6	5	4	3	2	1	0	
Nr			P/F	Ns			0	I-frame

Nr = Sequence count of next expected I-frame
P/F = Poll/Final bit
Ns = Sequence count of this I-frame

PID - Protocol ID, defines contents of TEXT field

xx00yyyy = Reserved, undefined at present

xx01nnnn = Reserved for AX.25 protocol
xx10nnnn = Reserved for AX.25 protocol
11110000 = plain text, no Level 3 protocol
xx11yyyy = Reserved, undefined at present

TEXT - Text field, 256 bytes maximum, ASCII code

Timeouts:

T1 - Receive timeout, 2-3 seconds
T1S - Frame timeout, time for frame of maximum length
Tr - Delay time (random) prior to transmission of first frame of a sequence, 150 milliseconds to 1.25 seconds

The source reference for questions about this protocol is in the ANSI Standard Document X3.66 describing ADCCP. We use the Balanced Mode of operation, with sub-options 2, 4, 7, 8, and 11.

Hank Magnuski, KA6M
Menlo Park, California
November 15th, 1982

To: Steering Committee for 2nd ARRL Packet Networking Conference
Fm: Hank Magnuski, KA6M, of the Pacific Packet Radio Society (PPRS)
Date: 15 November 1982

ARRL 2nd PNC Bulletin Nr. 1

Here is a summary of what is currently known about the tentative plans for the 2nd ARRL Packet Net Conference:

Date: Saturday, March 19th

This event will be officially sponsored by the ARRL (subject to final approval) and co-hosted by PPRS and AMRAD. Possibly the San Francisco Radio Club will have some sort of hand in the sponsorhip too.

The weekend of March 18th, 19th and 20th is the weekend of the 1983 West Coast Computer Faire. We will be a special interest group meeting within the Faire convention center.

The proposed schedule looks something like this:

Friday -- Setup and run RTTY & Packet demo equipment

Friday Night -- Dinner get-together for meeting coordinators, speakers, and ARRL Dig-comm committee members

Saturday -- Conference presentations all day

Sunday Morning -- Meeting of the ARRL Digital Communications committee. Brunch, possibly at the Cliffhouse Restaurant at the end of Geary, for committee members.

Sunday Afternoon -- Continue demonstrations and remove equipment.

We have tentatively been assigned two rooms for our use at the Faire.

Room 401 (60-80 persons) will be assigned to us all day Saturday, and will be for the bulk of the presentation of our conference. This is the room where the RTTY and Packet demo was held last year.

Room 403 (holds two 6 to 8 foot tables) will be dedicated to live packet radio demonstrations.

The series of papers presented Saturday in 401 will be totally under our control and coordinated by Paul Rinaldo, W4RI. He will select and collate the proceedings.

PPRS Members and approximate responsibilities:

Hank Magnuski, KA6M - Interface & Coordination with AMRAD
Stu Neblett, K6VCO - Demonstration Room & Equipment
Bob Reiling, W6JHJ - Coordination with Faire officials (if required)
Curtis Spangler, N6ECT - Bay Area & West Coast PR

Our Faire contact-person is Vondra Doherty, 415-851-7077. She will confirm our all-day use of 401 with Jim Warren at their next meeting.

She has invited us to present some additional (perhaps introductory) sessions to be a part of the regular Faire Conference and Proceedings. These extra sessions could be Friday. Deadline is November 30th and speaker kits are being mailed to K6VCO, KA6M and W4RI. Speakers get in

xx01nnnn = Reserved for AX.25 protocol
xx10nnnn = Reserved for AX.25 protocol
11110000 = plain text, no Level 3 protocol
xx11yyyy = Reserved, undefined at present

TEXT - Text field, 256 bytes maximum, ASCII code

Timeouts:

T1 - Receive timeout, 2-3 seconds
T1S - Frame timeout, time for frame of maximum length
Tr - Delay time (random) prior to transmission of first frame of a sequence, 150 milliseconds to 1.25 seconds

The source reference for questions about this protocol is in the ANSI Standard Document X3.66 describing ADCCP. We use the Balanced Mode of operation, with sub-options 2, 4, 7, 8, and 11.

Hank Magnuski, KA6M
Menlo Park, California
November 15th, 1982

free, have a flashy badge, and get printed.

Faire preregistration is $11.00. Any additional charges we wish to extract could probably be built into the tab for the PNC proceedings.

****

Everything in this bulletin is preliminary info, subject to change, and not for general media release!

TO: HM
FROM: DC
SENT: 13 NOV 82 17:22:01
READ: 13 NOV 82 21:37:16

To: all groups
From: KD2S
Re: what's in a name

I've received some comments on the naming of the new protocol to go out on the TAPR beta test boards. To clarify, the target protocol includes the physical control of all devices on board, the AMICON-compatible link-level routines (see Nov 82 QEX) and enough networking to test the routines mentioned. Included is a powerful monitor, a mechanism to modify and debug EPROM code (think about that for a minute) on board, and for coordinators or others interested, a set of EPROM burning routines.
In light of the explanation above, I'm reccomending to the rest of the group the following definition:

"The TAPR/AMSAT protocol is the implementation of the AMSAT Phase IIIB AMICON link-level protocol on the TAPR terminal node controller.".

As mentioned in the QEX article, this protocol may be suitably universal for both local area networking and long-haul linking.

Also, note that the FORTH software team here is not dead, but have been very busy doing things more important to them than amateur radio. There shold be a release of the TAPR/DA protocol (dynamic addressing) in the near future. The group is working on changing all of the simulation code into PROM'able code, and documentation will follow implementation as it now stands. People interested in FORTH on the TNC should contact me, and I'll discuss their needs, comments etc. with Marc Chamberlin WA7PXW.

TO: HM
FROM: DC
SENT: 12 NOV 82 05:57:58
READ: 12 NOV 82 17:02:04

TAPR Activities by Den Connors KD2S

The TAPR terminal node controller beta test is finally upon us! We have ordered the parts for the PC boards, and Lyle WA7GXD has populated one of the check boards, tested all of the required hardware and is ready to give the go-ahead for the 180 boards needed for beta test. Here's how it happened...

Pete Eaton WB9FLW and Bill Reed WDØETZ had been tapping the resources of St. Louis looking for a good P.C. layout facility and a group that could make our custom transformer. They were very successful with both tasks. The P.C. layout was sent to us in the first week of November, and after a careful look-see by Lyle, was modified and approved. The "final" layout arrived that weekend, and has again been checked. As the layout was shipped, Pete and Tom Brickey WBØWRK hid in a P.C. fabrication shop for a period of time, and out popped three extremely good looking "check boards", which are now in our hands here in Tucson. Also sitting down here is a copy of our transformer, with windings for +/- 12 volts as well as goodly quantity of +5 volts, after regulation. Lyle has put a board together, and he and Mark Baker will assemble a second unit later.

The final controller ended up being everything we've been promising, and quite a bit more. Lyle has included 24K of 2764 EPROM and 6K RAM on all boards going to test sites. The on-board Bell 202 type modem has had added to it a four-pole switched-capacitor audio input filter, and still has the built-in modem calibration circuitry. The off-board power supply circuitry is now entirely on-board, less the transformer and fuse holder. We did go 6809 of course, and kept simultaneous serial and parallel port capability (important for some linking experiments we're working on). The on-board wire-wrap area now has power and ground rails, with all three voltages available. It's quite a hummer. We'll be shipping out the boards with solder masking, special coating over the traces and silk screening for component identification. All cables and connectors will be included, less the non-standard radio connector. We hope to have completed shipping all units to Beta sites before the Christmas holidays, and we're currently on schedule, for a change.

(Please note that we don't sell these things for a living, but for those hams interested, we'll be coordinating efforts for further distribution with all of our beta site coordinators.)

And protocol... That brings up the software activities, which are now as geographically distributed as the hardware effort. As noted elsewhere in this issue, the AMSAT packet meeting held in October brought forth a standard protocol for the AMICON effort. The level 2 (data link layer), protocol chosen is not compatible with the current TAPR dynamic-addressing software being developed by Marc Chamberlin WA7PXW and Dave McClain N7AIG. The TAPR/DA routines are much more efficient at sending short packets, shaving 19 bytes off of the packet header in a repeated message, leaving more milliseconds for other transmissions. No guarantees as to delivery date will be made for this protocol, but Marc is now using some very sophisticated hardware/software tools that he and Dave have been developing, and information will be forthcoming as available.

TAPR is nonetheless committed in a BIG way to being fully compatible

with the AMICON standard, and the complete protocol will be availble on our TNC's. A separate software effort was begun following that meeting, with Margaret Morrison KV7D spearheading the Tucson efforts Margaret and Lyle have created a set of routines to interface the software and hardware of the TNC, and Margaret has recently completed a large part of a sophisticated on-board monitoring and debugging system.

The level 2 protocol routines are being put together now by a group that has already had considerable experience doing the X.25 logical link routines. Harold Price NK6K and Dave Henderson KD4NL were working earlier this year on some asynchronous point-to-point linking experiments using largely the same protocol.

Dave, Harold and Margaret have been working very hard together on the interface between high and low-level routines, and are pushing to complete a good set of routines for the first release of the boards to the Beta sites. A "soft" deadline of Thanksgiving weekend is the current target for the "EPROM burning party" for what we call the TAPR/AMSAT protocol.

The documentation for the software is actually being done at the same time as the routines are being written, and some very nicely worded interim reports have been generated by Harold and Dave. The software on both sides of the LA/Tucson connection has been pretty clean, and should be fairly easy for Pascal programmers to read. Chuck Green N0ADI has once again brought out the text editors and spelling check programs, and has begun the task of integrating all of the software and hardware documentation into the first release of the TNC manual, which obviously has the same deadline as our board shippings.

Our final count for Beta test sites, incidentally, was 19, with several sites having over a dozen operators. These cities are scattered across the country, and a list of them will appear next month, along with information on how to contact the site coordinator. Linking these sites will be an interesting undertaking, and several methods will be tried. In addition to setting up a weekly HF net for all of the sites to discuss current problems and cute ideas, we'll be trying to follow in the footsteps of Tom Clark W3IWI and Bob Diersing N5AHD with 10 meter long-haul links. Mike Parker KT7D and Lyle are working on an L-band non-linear amplifier for use with the AMSAT Phase IIIB satellite, and Lyle and I are doing much of the planning for the new PACSAT packet satellite system. Some special linking experiments are being developed in the New York/New England area, and we'll have more to say about these efforts next month.

TAPR has experienced a strong period of growth, and we're now well over 200 members. The bi-monthly newsletter, Packet Status Register, is looking good, and will be used as a primary mechanism for updating amateur packet operators with in-depth information on TNC hardware, linking experiments and the latest software releases, as well as continuing newsey articles and an occasional tutorial. For further information, please contact us at P.O. Box 22888, Tucson, AZ. 85734.

73, Den and the TAPR group

(

(

Date: 11 Nov 82 0006-PST
From: Alan Larson (WA6AZP)
To: Hank (KA6M)
Subject: Meetins, etc.

It all seems reasonable for the meetins to be at SRI. We will have the classroom, which is not as bis as the place we had at Ampex, but should do if we squeeze a little bit.

I was trying to send this by radio, but just after I started sendins messages, I stopped settins replys. I sent a lot of retrys until it timed out, but it seemed strons on the ID from your end and the close worked fine. However, I could not set any packets into the DG. I did not understand.

Sorry I could not be over to see you folks this evenins. I am impressed by what the TAPR folks are doins, and would have liked to meet any of them.

Does that TAPR board you had there work? I was lookins at various ways of puttins a SRI computer on as a mailbox for a while. I was particularly interested in seeins if the machines could talk to each other for mail transmission. (This will be a lot easier if you set a UNIX system soins there on one of the little ones!) I have not sotten beyond the dreamins stase yet, but would like your input in that sort of direction. -- One of the ideal soals would be to be able to handle multiple connections at once - this would be done by puttins packet handlins in the computer, and not on the board -- perhaps that is farther off.

See you later.

Alan

Date: 11 Nov 82 0906-PST
From: Alan Larson (Wrenn)

It all seems reasonable for the meeting to be at SRI. We will have the
[illegible] which is not as big as the place we had at Avenir, but should
do if we squeeze a little bit.

I was trying to send this to [illegible] but after I aborted sending
[illegible] I observed spelling errors. I send a lot of notes [illegible]
timed out, but it messed [illegible] time. Nice work!
[illegible]. However I could not see any records into [illegible]. I did not
[illegible].

Sorry I could not be over to see you folks this evening. I am interested
to see what the TAP folks are doing and what' have [illegible] to meet another [illegible].
Does that TAP control box [illegible] work? I was looking
[illegible] various ways of putting a TTL computer on as a [illegible] for a while.
I was seriously [illegible] if the resources could [illegible] to
[illegible] other for next [illegible]. (This will be a lot easier if you
[illegible] a UNIX system [illegible] one of the little ones!) I have not
[illegible] beyond the dressing steps yet, but would like [illegible] in
[illegible] sort of direction -- One of the [illegible] could [illegible] is to
[illegible] to handle multiple connections at once - [illegible] be done
by putting [illegible] in the directory and not in the [illegible] -- perhaps
[illegible].

See you later,
Alan

TO: HM
FROM: DC
SENT: 09 NOV 82 06:03:00
READ: 09 NOV 82 17:44:06

TO all groups
FROM Den KD2S

I'd like to thank very much all the packet groups who have helped both directly and indirectly with our latest efforts at bringing out the next generation of stand-alone terminal node controllers here in the U.S.

Though the efforts of a lot of different TAPR sites as well as Tucson, I'm proud to announce the official start of Beta test, with 19 sites and 180 TNC boards involved. We will be happy to keep all groups updated with our activities, and I'll keep project updates on PRNET.

Our boards should be delivered, fully assembled and tested, with 24K EPROM and 6K ROM on-board, and with all connectors, etc., before the year is out. The first protocol will look remarkably like the new AMSAT/AMICON protocol, and I hope to hear from all the other sites on PRNET next year on phase IIIB.

I'll send a release on the next stage for beta coordinators, as well as a breakdown on individual sites in a message tomorrow.

73, Den KD2S

TO: HM
FROM: WWP
SENT: 08 NOV 82 16:41:38
READ: 08 NOV 82 17:43:48

Hank FYI, relay'd, relay'd stuff

Bill - WB6RFW

BILL:
HERE ARE A FEW THINGS YOU MAY FIND INTERESTING THAT I GOT
FROM SKIP YMH'S BBS.

MSG # 7, 11/16/81 FROM SCOTT W3VS
TO ALL 'HAMNET'
FOR ANY OF YOU WHO MAY HAVE ACCESS TO COMPUSERVE, I WOULD
LIKE TO SUGGEST THAT YOU CHECKOUT OUR SPECIAL INTEREST
GROUP 'HAMNET'. WE ARE JUST GETTING ROLLING AND ARE
SETTING UP SECTIONS FOR PACKET RADIO,AMSAT,ARRL,ETC.
TO GET TO US, SELECT THE PERSONAL COMPUTING AREA
(MICRONET) FROM THE MAIN MENU. THEN SELECT SIGS.
WE ARE LISTED AS A GENERAL INTEREST SIG. HOPE YOU CAN
JOIN US. WE WOULD LIKE TO HELP GET THE PACKET RADIO BALL
ROLLING BY HELPING TO SERVE AS A CENTRAL CLEARING HOUSE
OF INFO. LET US HELP SAVE US ALL SOME LONG DISTANCE
CHARGES! - SCOTT W3VS HAMNET SYSOP

MSG # 170, 05/08/82 FROM JAMES N6CFI
TO ALL 'PACKET RADIO MODEM SOURCE'
TO ALL INTERESTED IN OBTAINING BELL 202 COMPATABLE MODEMS
FOR USE IN PACKET RADIO, NOVATION IN CANOGA PARK (MAKERS OF
THE CAT MODEMS., ECT.) HAVE A 202 COMPATABLE MODULE FOR $99.00
THIS MODULE, THE 120LSM (PART NUMBER 490280-2) RUNS OFF OF 12
VOLTS, AND IS EXTREMELY EASY TO INTERFACE TO A RADIO AND TO
A COMPUTER. IT IS CAPABLE OF EITHER 2 OR 4 WIRE MODES OF
OPPERATION, AND IS BASED ON AN LSI MODEM CHIP. TONES ARE XTAL
CONTROLED FOR +/-0.2% TOLERANCE. RECEIVE SENSITIVITY IS 0 TO
-45 DB, TRANSMIT LEVEL IS -8DB (MORE THAN ENOUGH TO DRIVE ANY
RADIO. INPUT AND OUTPUT ARE SET UP FOR 600 OHMS. ABOUT ALL
THAT IS REQUIRED TO INTERFACE THEM IS A LM324 QUAD OP AND TO
CONVERT THE CMOS LEVEL SIGNALS TO RS-232 SIGNALS, AND A SIMPLE
RESISTIVE PAD TO ADJUST THE INCOMING AND OUTGOING LEVELS. FOR
MORE INFORMATION, EITHER LEAVE ME A MESSAGE, OR CONTACT NOVA-
TION DIRECT AT (213) 996-5060. OR WRITE THEM AT NOVATION /
18664 OXNARD ST. / TARZANA, CA 91356. GOOD LUCK... JIM

MSG # 50, 03/23/82 FROM TED SHAPIN
TO ALL 'PACKET RADIO'
THE PACKET RADIO STUFF THAT WAS ON THE
BERKELEY CONFERENCE TREE HAS BEEN MOVED TO ANOTHER
BBS (415)863-7715.
I WILL LEAVE SOME OF THE BASIC INFO ON THIS
SYSTEM.

Hank,

Little RTTY traffic on tonight. Anyway, could you re-send me those new addresses that I sent you; I think that the msg. was sent on the 31st of October. I will probably have the checks addressed to me, since it will involve some accounting; besides it will take a little pressure off your shoulders. I left a message on Dave's answering machine in reference to the 17th, and hope that I hear from him before I leave. In case that my trip gets extended, I will call you at Gamma. 73, best
-cas-

To: Hank
From: Bill
Subject: Possible real mail system for DG machine?

I don't know if the DG supports a RATFOR, but if it does, the following may be a way to get a real mail system up for packet users (and others!).

Bill

-------- Forwarded Message

Received: Network mail from host SANDIA for news.info-vax on Thu Oct 7 07:53:54
Mail-from: ARPANET site LBL-UNIX rcvd at 7-Oct-82 0842-MDT
Date: 7 Oct 1982 07:29:28-PDT
From: lbls!sventek#J at LBL-UNIX
Subject: VAX Mail Systems
To: info-vax at sandia

As a result of an experiment in the design and implementation of distributed applications, a portable electronic mail system will soon be released from LBL. The system is based on an extension of the Software Tools Virtual Operating System, and is characterized by the following features:

1. All current DARPA standards concerning mail format, addressing and transport (RFC822, RFC819 and RFC821) are supported in their entirety.

2. The software is strictly partitioned into a delivery system, which handles local delivery, intermachine transport and return of undeliverable mail, and user-interface utilities, for mail composition and manipulation. The user-interface utilities provided with the package are sndmss and mss.

3. The code is written in RATFOR and uses the Software Tools Virtual Machine for accessing system resources. The code is currently operational on RSX-11M and VMS, and a port is in progress to VMUNIX and PDP-11 UNIX, 2.8BSD.

4. The interface between the delivery system and the network substrate for intermachine transport is open-ended and stylized. To cause mail to be transported over a newly-introduced network requires 5 network specific functions to be written. Networks currently supported are DECNET, UUCP and LBL's Hyperchannel protocol, with TCP to be supported when our local net is operational. It takes ~2 staff-days to cause mail to be transported over a new network link.

5. An integral news service, several levels of user aliasing, rewriting rules for munging hybrid addresses, and explicit routing of messages are just a few of the features supported by the system.

The software is in the public domain (FREE), and will be available in the December time frame as a portion of the Fall 1982 Maintenance Release of the Software Tools Virtual Machine on the VAX SIG tape from the Fall '82 DECUS Symposium. When the software is ready, I will also make the source code available for FTP access on LBL-UNIX. It should be noted that our ARPANET host will probably be using TCP/IP at that time, which may impact how the software is obtained. It is also the case that I am unable to make tapes of the distribution. Any questions can be directed to me by net mail.

Joe Sventek
J@lbl-unix

End of Forwarded Messase

Date: November 1, 1982
To: All Interested Packeteers
From: Curtis N6ECT@PPRS

Subject: Calls Lossed OCTOBER 1982

There were 108 calls lossed on KA6M** PACKET CENTRAL
56 contacts were made via packet radio

Those active were: KB6WP N6GJH K6VCO WB6YMH WA6JFZ WA6AZF WB2GDQ
KD6LI N6FQR W6JHJ KA6NAN N6ECT

Total Active: 12

73, -cas-

Hank:

I will be out of town for about a week, so I am trying to set the mailing done. I will be using the same format as the last letter, but would like to make sure that the subject material is correct. for example:

Subjects to be covered at the PPRS meeting will include a review by Hank, KA6M on the new software that is soon to be released.

P.S.

This will be the "last free mailing". If you wish to continue being on the Pacific Packet Radio Society mail list please send a five dollar donation to: (me) .

The above is the end of the letter... changes accepted. There are a few other things that I need to know... 1). do you want me to call Dave about the cafeteria?... 2). is the evening of the 17th still good?...

I will be leaving this thursday, and should be back by the 11th.

Hope everything is well with you and yours... 73... best

-cas-

What did the battery say to the potato chip?
(answer located under joke.doc)

I will be back Thursday, and should be back by the 11th.

Hope everything is well with you and yours... JT... best

What did the pathers say to the potato chip?

Hank,

Yes, the EPROM worked, I only needed the one, but I have the other saved. (Just in case...).

I had been wondering if there was a standard of deviation if I did have the meter. It sounds like we are only using about 1Khz WA6AZPCCCCCCWA6AZPC just had trouble with link to you..
(Now what made it). Thanks for the reset info, and I will grab the mail for WA6SLF and print it (I plan on trying this on a computer line at SRI before long.) The info on how to specify call+ was just the question I was about to ask!

More later.

73, Alan

TO: HM
FROM: DC
SENT: 31 OCT 82 02:48:43
READ: 31 OCT 82 04:24:32

To all packeteers de W3IWI, KD2S, KA6M:

The files listed below
contain the edited outputs from the Packet Radio Meetins held by AMSAT
earlier in October. Hope they are of use.

Special to AMSAT Satellite Report
de Hank Magnuski, KA6M 12 October 82
(minor editorial revisions de W3IWI)

AGREEMENT ON PACKET RADIO STANDARDS!

As part of the October 10th, 1982 AMSAT (Radio Amateur Satellite Corp.) general meetins, president Tom Clark, W3IWI, invited a number of leaders of active packet radio groups to come to a special workins group meetins on Friday, October 8th, to discuss the future developments in packet radio activities; specifically, this meetins was intended to discuss AMICON (the AMSAT International Computer Network) for the Phase-3B spacecraft and to discuss a new project (tentatively called PACSAT) involvins a low-altitude orbit, all digital store-and-forward transponder. To Tom's pleasure and surprise, the meetins was well supported and a number of people showed up, representins these groups:

New Jersey - Phil Karn, KA9Q;

Tucson Area Packet Radio (TAPR) - Den Connors, KD2S and Lyle Johnson, WA7GXD;

St. Louis Area Packet Radio (SLAPR) - Pete Eaton, WB9FLW;

Washinston (AMRAD) - Paul Rinaldo, W4RI, Dave Borden, K8MMO, Terry Fox, WB4JFI and Eric Scace, K3NA;

Pacific Packet Radio Society (PPRS) - Hank Magnuski, KA6M;

AMSAT - Tom Clark, W3IWI, Jan Kins, W3GEY, John DuBois, W1HDX and Bob Carpenter, W3OTC.

Even more surprisins is that this diverse group managed to agree on some thinss. In fact, the agreement reached on adoptins a common link level protocol may prove to be extremely significant in formins the foundation for U.S. packet radio networkins. The meetins which orisinally was supposed to iron out some AMICON details managed to have much more of an impact. Here's some backsround on what happened:

A year ago, in conJunction with the '81 AMSAT seneral meetins, Paul Rinaldo orsanized the first Packet Radio Networkins Conference under the sponsorship of AMRAD, ARRL and AMSAT in Washinston (some excellent conference proceedinss are still available). Many ideas and some real and paper networks were discussed. In the months which followed quite a few people sot their packet radio controllers runnins and had a chance to experiment, read, discuss and think about various problems involved in implementins packet radio networks. The situation became discourasins. It seemed like a new protocol was proposed for each new set of Terminal Node Controller (TNC) hardware that came on the air. Each group started headins ✓

off in a somewhat different direction. The promise of compatible systems was growing remote. But in this dispersion of effort, people also found out how difficult it was to implement private protocols and how difficult the interconnection would be if common ground wasn't found soon. The different groups also came to realize that there were a common set of problems to be solved and that one area's solution couldn't ignore the requirements of other users. The summer doldrums saw very little activity and not much progress, and provided the background for the AMSAT meetings. This inevitable diversity during the R&D phases for each of the groups had to be reconciled with the impending launch of the Phase-3B satellite in February, 1983.

The AMICON Network

Three major areas of concern filled the agenda of the AMICON meeting: the usage of the Special Service Channel (SSC) earmarked for digital experimentation and called "AMICON" in AMSAT planning documents; the recommended modulation methods and bit rates to be used on the Phase-3B SSC; and the detailed link protocol to be used for linking ground stations via the satellite.

There was general agreement that standards accepted today must be regarded as developmental. It is to premature to ordain any single scheme at this time. The AMICON concept is not yet a detailed network design, but rather an opportunity to develop a new service for amateur radio. In the developmental phases we may well see many diverse techniques being tested. The meeting discussed the concept that the use of high-altitude satellites for packet radio would be sufficiently complex that it was unlikely that many individual users would be able to muster the resources for individual access. Rather, AMICON would probably evolve as a channel for linking local "concentrator" nodes around the world.

There was a lot of discussion on suitable modulation methods and bit rates that could be supported by Phase-3B. Den Connors and Lyle Johnson of TAPR, Paul Rinaldo of AMRAD, and Tom Clark and John DuBois of AMSAT presented their research findings. Many different modem types were reviewed and international requirements were discussed. After all the debate the following conclusions were reached:

1. The AMICON SSC usage should be restricted to 5 kHz bandwidth (at the -26 dB points). Modem performance must be a primary consideration for any ground station, and the modem used will probably be of a rather advanced design.

2. The use of 202-type modems using NBFM-AFSK will not work.

3. The use of 202 modems using SSB-FSK will produce marginal results.

4. A 400-1200 bps channel speed is probably optimal, as this speed satisfies a variety of different constraints and requirements.

5. The PSK modulation techniques developed for Phase-3B telemetry should be explored at both 400 and 1200 bps.

6. The AMRAD and TAPR groups are going to pursue development of a modem which employs Minimum Shift Keying (MSK). MSK and PSK are considered the most promising methods at this time.

7. The SSC will have to be open for different experimental approaches until there is general agreement and experimental validation of

"the" optimum method.

Considering all the alternatives which were discarded, the above resolutions represent a significant narrowing of focus. If that wasn't enough, more was yet to come!

Eric Scace reviewed the work which had been done by the NJ & AMRAD packeteers to adapt the international X.25 protocol to amateur needs. The amateur subset has been documented by Terry Fox, and is now called AX.25. Hank Magnuski distributed a tutorial document on connectionless protocols and described work which had been done to develop Revision 4 of the TIPM and LIPM software. This is the first implementation of TNC software utilizing only amateur calls (and not hard-wired assigned addresses) for addressing.

By the evening of the October 8, the group began to recognize that only very minor differences separated the AX.25 and LIPM.04/TIPM.04 approaches. The TAPR protocol users were willing to implement an interface based on the recommendations which would come out of the meeting. The differences were resolved and led to the unanimous adoption of a subset of an internationally recognized link level protocol (specifically it is called ANSI X3.66 ADCCP-HDLC BA Class, with options 2, 4, 7, 8, & 11).

Why is this important? First, this link level protocol allows two AMICON ground stations to construct a packet pipeline. This same protocol can be used between two stations in a terrestrial backbone net. The same protocol can also be used for terminal-to-terminal connections, whether direct or via a simplex packet repeater. It represents only a slight extension of the CCITT X.25 LAPB link level protocol. And finally, it does not restrict future development of ISO Level 3 virtual circuit or datagram protocols.

The key feature of the new design is the adoption of a scheme for using call-sign addressing in a packet. The packet format looks like this:

FLAG1	TOCALL	FMCALL	CTL	PID	INFOFIELD	FCS	FLAG2

where:

FLAG1	Standard opening HDLC flag byte (01111110)
TOCALL	The destination call-sign (6 char's plus sub-station ID code)
FMCALL	The source call-sign (6 char's plus sub-station ID code)
CTL	Standard HDLC control byte
PID	Protocol Identification byte for information frames.
INFO	Information field in information frames
FCS	Frame CRC check sequence
FLAG2	Standard closing HDLC flag byte

Frames to be repeated by a local area network simplex packet repeater also contain a third address field following the FMCALL field. This third field is the callsign of the repeater. More details on this protocol will be published in the revised AX.25 specificiation document by WB4JFI et al.

Collectively, the group considered that nearly every link design starts out with a statement something like this: "Holy 807's, look at all the overhead bytes you have in using call signs as addresses. I can do it with just 4 bits." We have found that these other schemes have their own defects and that the penalty for the call sign overhead is relatively small in comparison to other delays on the link and in view of the other bene-

fits. In addition, both amateurs and their regulatory authorities are particularly defensive that the individual's call sign is sacrosanct and tantamount to being a personal name.

The AMICON session ended with promises from various representatives to try to implement the required versions of this new protocol. In the interim, LIPM.04/TIPM.04 will be available for use by AMICON ground stations until the new software is ready.

PACSAT

The other main topic of the meeting concerned the possibility of a dedicated packet radio satellite. This is discussed in a companion news release from KD2S and W3IWI (see below).

PACSAT -- A New AMSAT Satellite Project

Den Connors, KD2S and Tom Clark, W3IWI

A new type of amateur satellite was proposed by Tom Clark,W3IWI, at the packet radio working group meetings held 8-11 October, 1982 at the AMSAT laboratory in conjunction with AMSAT's annual general meeting. The working group meeting was also noteworthy in that it provided a focus for the various packet radio groups to coordinate their activities and resulted in a new unifed protcol which is described by Hank Magnuski, KA6M, in a companion document. The new satellite project has been tentatively dubbed PACSAT -- a final name is yet to be chosen, pending resolution of some potential copyright conflicts. This satellite would build upon AMSAT's experience in low-cost spacecraft development, the current upsurge of interest in digital and computer techniques, and the technology being developed for amateur packet radio applications. The basic idea is to implement an orbiting digital packet radio repeater with store-and-forward capabilites. This satellite would allow amateur "electronic mail" service with a few hour delivery time to anywhere in the world -- a virtual "flying mailbox" for amateur radio and computer enthusiasts.

The "strawman" system proposed by Tom and discussed during the three days of meetings, would have one or more high-speed packet radio channels, and possibly other ASCII or RTTY input/output channels. An onboard computer system would control a large amount of memory storage -- perhaps as much as one megabyte for messages. Access to the message system would be somewhat like using a more traditional computer bulletin board system (CBBS) using landline dial-up capability. Using a Phase-2 type of low-earth orbit ("LEO"), the satellite would be available several times a day for up to 15 minutes worth of message reading and writing. Although the LEO satellites are limited in their coverage, the store-and-forward capability could extend an AMSAT-OSCAR-8 type satellite to provide global coverage.

One of the major problems with such a concept is that packet radio represented new technology to most amateurs, although we see a marked rise in amateur interest in computers. In order to make a PACSAT be a viable concept, the current packet radio "experts" will have to devote considerable efforts to making reliable ground-station hardware and software available to AMSAT's user community, and they will have to embark on a concentrated educational program to explain these new concepts -- some of the attendees at the working group meeting noted that they were around when the SSB vs. AM "wars" were raging in the early 1950's.

One of the major technical problems that will have to be solved before a PACSAT (or the AMICON channel for Phase-3B) is viable involves modems. None of the standard commercial modems seem suitable for noisy channels with doppler shift. Several alternatives were discussed during the meetings. The modulation techniques mentioned included phase-shift keying (PSK) and minimum-shift keying (MSK). Discussions of data rates for up- and down-links ranged from 400 baud up to 56 kbaud; the technical constraints associated with acceptable bit error rates and practical contraints of implementation cost and difficulty plus available spectrum space led to a consensus that likely rates were in the 400-2400 baud range. Although the Phase-3B telecommand group have implemented state-of-the-art 400 baud PSK modems and W4RI has been working on MSK designs, the use of either technique will require considerable work in order to develop high reliability modems usable by the amateur community. For any digital usage of amateur satellites, it is clear that modems will be more complicated that the traditional frequency-shift keyed systems currently used for RTTY.

The strawman design Tom presented involved multiple uplinks and a single downlink (e.g., one calling uplink channel and perhaps four working channels). This built upon typical amateur net experience with the satellite acting as "NCS" on a calling-and-answering frequency. After the user calls in and establishes that he has uplink traffic (or that the satellite has a message for him), he would directed to QSY to a working message channel where the spacecraft's computer would "poll" the user until both he and the spacecraft are QRU. This design is based on the use of ALOHA-type protocols where the multiple users cannot hear each other, leading to possible "collisions" on the uplink channels; this, combined with Tom's assumption that "what goes up must come down" (i.e. the total message traffic up and down are about equal), led to the multiple uplink, single downlink proposal. Tom's proposal was that the uplink and downlink were full duplex (simultaneous transmission and reception) involving two bands (probably 435 Mhz uplink and 145 MHz downlink). The design assumed that 0.5-1.0 Megabyte of storage was available onboard which could be treated as a "virtual disk" for planning. All messages would be "bit-regenerated" (i.e. no "direct" channel exists between the users except through the satellite), and control of the communications would be by an active, onboard computer. Other functions to be performed by this computer would include the access mechanism to manage the "virtual disk" storage, handling of the protocols to allow multiple users to get their messages up and down during a single pass, and possibly inter-spersing of "QST" bulletins in the downlink data stream during moments of inactivity.

On Saturday, the AMSAT members attending the technical forum were allowed to hear packet radio in action on AMSAT's W3ZM (146.235/.835) repeater. W3IWI brought a microprocessor-based Terminal Node Contoller (TNC) developed by the Vancouver Area Digital Group (VADG), a "202A-type" AFSK modem, and a standard 2m FM transceiver. Some 50 miles away in Sterling Park, VA, Dave Borden (K8MMO) had his Z-80 CP/M computer hooked to a similar TNC and modem. Amidst normal talk-in activities, the two packet radio terminals were sending brief data packets through the repeater so that those attending the meeting saw a game of "ADVENTURE" being played in the squelch tails. This impressive demonstration was the first exposure for many AMSAT members of the capabilities of digital techniques in amateur radio.

As the weekend proceeded, a number of informal discussions on packet radio continued. Among the experts there grew a general agreement on the data link protocol, with the AMSAT AMICON ADDCP-HDLC definition emerging as being the best for the "LEO" PACSAT too. Arguments for and against Tom's proposal for multiple uplinks (supporting a single downlink) centered on the estimated relative traffic loadings on satellite uplink and downlink. These

dear,

Sorry the EPROM worked. I only needed the one but I have the other
saved. Glad to see...

I had been wondering if there was a standard of deviation if I ord
have the meter. It sounds like we are only using about 1Khz
just had trouble with link to you.

Glad what made it). Thanks for the reset info, and I will open the
wait for MAGIC and print it (I plan on trying this on a computer line
at SIT before long.) The info on how to assemble (still use just the
question I was about to ask!

discussions included the observations:

-- CBBS experience shows that users "browse" through stored information much more than generating new information. If the PACSAT is to be operated as a flying CBBS, then the design should be reconsidered.

-- The "QST" bulletin transmissions will be a very important PACSAT function for the users.

On Sunday, a proposal was made by Den Connors and Lyle Johnson which included a number of the above concepts. Different mechanisms for access using full-duplex uplink/downlink pairs were presented. The AMSAT AMICON (AMRAD AX.25) HDLC logical link protocol was discussed in as a PACSAT standard and a number of network-related issues, including message classifications and buffer allocation/deallocation mechanisms were raised. Lyle presented another possible system block diagram, showing different input/output channels, including command, multiple CPU's and different memories for program store, file directories, buffers and message mass storage. The tasks of the CPU were further detailed, and the different algorithms needed were identified.

During this discussion, Tom Clark outlined the possibility of a truly international implementation strategy. Tom described one scenario with the system design and user eduction/interfacing being the prime U.S. responsibility, on-board hardware constructed in South Africa, satellite integration performed in the United Kingdom and actual launch handled by the commercial group in Texas which has recently flown a successful test mission (see A.S.R. #41, September 13, 1982). A part of the discussion involved the possibility that part of the US role might also include a new role for AMSAT in being responsible for the distribution of the hardware unique to packet radio unless commercial interest is seen soon; this could serve as a method for generating much needed revenues to support all of AMSAT's activities. To help set this activity moving, Den Connors agreed to act as interim PACSAT coordinator.

The general PACSAT concept was presented at the AMSAT general meeting, and the AMSAT membership welcomed the idea, with the only caveats being expressed as "Can we afford it? Are we stretching ourselves too thin?" Tom indicated that these were AMSAT management concerns too but that the key individuals were very enthusiastic about the concept. He stated that without a dedicated "hardcore" of technical volunteers, AMSAT loses its vitality. Since no further opposition was raised, Tom indicated that further development of the PACSAT concept can be expected.

Since the meetings at Goddard, Den has accepted the position of Project Manager for the US part of the PACSAT project, and several developmental efforts are in the formative stages. ZS1FE has confirmed the South African interest in pursuing the project, and G3YJO has begun "selling" the rest of the payload (which may well be called UoSAT-2). Key developments in the next few months will include ground station design, technology investigations to identify large flyable memories and modem (both MSK and PSK) design, planning for maximum utilization of the Phase-3B designs, conceptual designs of the on-board communications and processing hardware and software and coordination of the roles between the various groups that can contribute to this project.

It is hoped that this satellite will not only give the packet radio experimenters a much awaited international linking capability, but also provide a new, challenging and unique outlet to the many thousands of new hams who are quite savvy in computer techniques and utilization. The AMSAT

Hank,

Yes, the EPROM worked. I only needed the one, but I have the other
[illegible] saved in case.

I had been wondering if there was a standard of deviation if I ord
have the meter. It sounds like we are only using about 1KHz W6GA?PCC(?)Wm6A?PC
just had trouble with link to you.
Now what made it). Thanks for the reset info, and I will [illegible] the
wait for W6GJE and print it (I plan on [illegible] this on a computer line
at 9:1 before long.) The info on how to [illegible] will use just the
question I was about to ask!

[illegible]

73, Al=

team solicits your indications of interest and assistance. This, as with all AMSAT projects, is a volunteer effort -- can we serve as a focus for your creative ideas?

Very the EPROM works! I only needed the code but I have the other
[illegible]

I had been wondering if there was a standard of deviation if I did
have the meter. It sounds like we are only using about 1KHz [illegible]
real bad trouble with link to you.
Show what made it). Thanks for the repeat info, and I will [illegible]
wait for MAGSLE and print it (I plan on having this on a computer like
a SIT before long.) The info on how to assemble still was just the
motivation I was about to seek!

Yours Sylvan

73, Allen

Hank,
The below person has an address change:
WA6UHA, David Billeci, 300 Bella Vista Way, San Francisco, Ca. 94127
I have been contacted by the followins people; to be added to mail list:
WD6DRQ, Harry S. Conlin, 145 Curry St., Richmond, Ca. 94801
KA6UVF & KA6VDO, Art & Pat Fisher, 271 Missouri St., San Francisco, Ca. 94107
Eric Fears, 3510 Mountain Blvd, Room # 402, Oakland, Ca.

And one point of interest!!! they discovered about Packet throush the C.Q. Mag.... Nov. issue..
73, -cas-

To: All Packeteers
From: Bill Danielson and Ron Brown

Here are the errors/changes that Ron and I made to set our VADCG modem boards op

In the instructions, the pictorial of the PC board contained the following errors:

1. The jumper wire above C11 is not shown.
2. The locations of the resistors R27 and R19 is reversed.

The values of the resistors R15 and R17 are reversed. R15 should be a 33K resistor and R17 should be a 16K resistor. In my schematic, R15 is the resistor connected to pin 7 of U3 and R17 is connected to pin 8 of U3. This error causes the two modem frequencies to be reversed.

The 1uF capacitor C4 is not listed in the parts list.

In addition, I made the following modification:

The board contains a CMOS switch (4053) to automatically switch the transmitter input betwen the modem and a PTT microphone. It also can use the receiver's sequelch output as a transmit disable. I did not want either of these features so I disabled them and used the parts on the board for a CTS indicator. To do this:

1. Remove D2, D3, and D7.

2. If you cannot find a 4053, you can replace it with a header with pins 13 and 14 connected since it no longer needed as a switch.

3. Connect the "squelch in" line to the "CTS" output line. This can be done either on or off the board.

PIN 3, the Squelch LED driver output, is now the CTS LED driver output!

Misc comments:

After tuning the modem as described in the instructions, you can check it out by temporarily connecting pin 7 (audio out to xmitter) to pin 12 (audio in). [Make sure nothing else is still connected to these pins!] This puts the modem into what's known in the modem trade as analog loopback mode. Adjust the output level using R20 until the carrier detect lamp comes on. Now if you toggle the TXD input between +12 and ground, you should see the TXD and RXD leds track each other (Both should be on or off at the same time!). The carrier detect lamp stay on continuously.

To make a quick test of the RTS delay circuitry, you can toggle the RTS line between 12V and ground and watch the RTS and CTS indicator LEDs. You should see a short delay between RTS becoming TRUE and CTS becoming TRUE. To test the send hang timeout circuitry, leave RTS TRUE for a long period (over 1 minute) and you should see CTS go false after 30 seconds to a minute.

Good luck,

Bill N6FQR
Ron WA6JFZ

Date: 26 Oct 82 2245
From: Larson
To: Hank, KA6M

I was wondering if there was a standard for the level of modulation of the transmitter. My level was way too high, and causing a lot of trouble for the repeater and computer. Rob was able to turn down his volume and set me fine, but I had to tweak the output voltage divider to set the right levels to make it work. I still don't know if they are right.

I have been thinking about some of the internal protocol level features that might be needed. I will try to write a document of my ideas for some discussion.

What if I manage to do a connect and then the signals are not good enough to do a disconnect from the computer? Is there some way to do it even if the ^^D fails after n retrys?

If possible, it might be better to reply to me on usenet, as ucbvax!menlo70!sri-unix!larson (there may not be a - in sri-unix).

73,
Alan

John,

Is there life in Vancouver???

Haven't heard much from you up there. What's new? How are sales going? About how many TNC's have you sent out now?

We had our first meeting since after summer last night, so things are starting to pick up again.

Hank

TO: HM
FROM: JS
SENT: 26 OCT 82 06:00:56
READ: 26 OCT 82 23:31:51

Hank,

Depends on your definition of life, to be sure, no actually I guess we could blame it on the summer doldrums too. You should be getting a newsletter shortly and the next thing on our list is the annual Personal Computing Fair where we will be giving the usual demonstrations and talks.

Plans include getting on 20m with the Collins crystal controlled rig, putting a TNC on a local multiport BBS and an RTTY gateway. After that there will be the satellites to consider. We are still hoping to see a station node developed, as well as a broad band dedicated radio design.

Stuff is still selling steadily, although we must have over 6 months inventory of some parts at the current rate. We've sold nearly fifty of the TNC parts kits and another fifty plus of the modems.
How many TNCs have you had made up from the artwork Don sent you? We still have about 150 left
from our last order. Wouldn't mind moving them out before 2708s become completely passe.

Now that there is some agreement on the standardization of the protocol we should get the various TT versions rationalized so that bugs common to all have been removed and if there is any reason to have more than one that they all have a full set of features. Is any further work being done on the .04 TT software? VE7CVS's revision is supposed to go in the mail this week.
Enough for now.

73 es cul
John, VE7ADE

TO: HM
FROM: DC
SENT: 25 OCT 82 03:39:06
READ: 25 OCT 82 16:31:32

TO ALL BETA TEST COORDINATORS
FROM DEN KD2S
RE "THE TEST"

I'm sending you a copy of a letter which is being sent to all coordinators this week. We need to know who out there wants to help with the test still. At this time, I only have about 140 known "confirmees", but we need to have those people reconfirm. We have a "drop dead" date of Nov. 7, for we will order the first set of parts the next day. Feel free to use this medium to advise me of any late additions/cancellations up to that time. It's finally upon us!

NOTES:
1) The beta boards will be sent with 24K (2764) EPROM and 6K RAM.
2) All cables and connectors (except the radio connector) will be shipped.
3) The transformer, power cable and fuse/fuse-holder will also be shipped.
4) The software that will be on-board will be a VADCG-like protocol written by Lyle WA7GXD for testing operation and compatibility.
5) If the software is ready, AX.25 protocol will be available, courtesy of the efforts of Margaret KV7D and Harold NK6K et al. in LA.
6) If the software is ready, TAPR/DA (dynamic addressing) protocol will be available, courtesy of Marc WA7PXW and Dave N7AIG.

Tucson Amateur Packet Radio
P.O. Box 22888
Tucson, AZ 85734
October 21, 1982

Dear Beta Coordinator:

We are nearing the time when Beta Test will be in high gear, with TNCs being built, tested, and shipped. We are writing you to let you know our anticipated schedule, and to make our request for firm orders.

At present, the final layout of the Beta board is being done through the efforts of SLAPR, our affiliate in St. Louis. We expect to receive the layout by November 10. At the same time we intend to make our initial parts orders. Once this is done we are locked into a rigid schedule based on the parts invoicing. Therefore, before we make our parts order (currently anticipated to be November 8) we MUST know the true number of TNCs destined for your site. This means we need a firm order for each TNC. We also need to cover our preliminary costs (board layout will exceed $1300, for example).

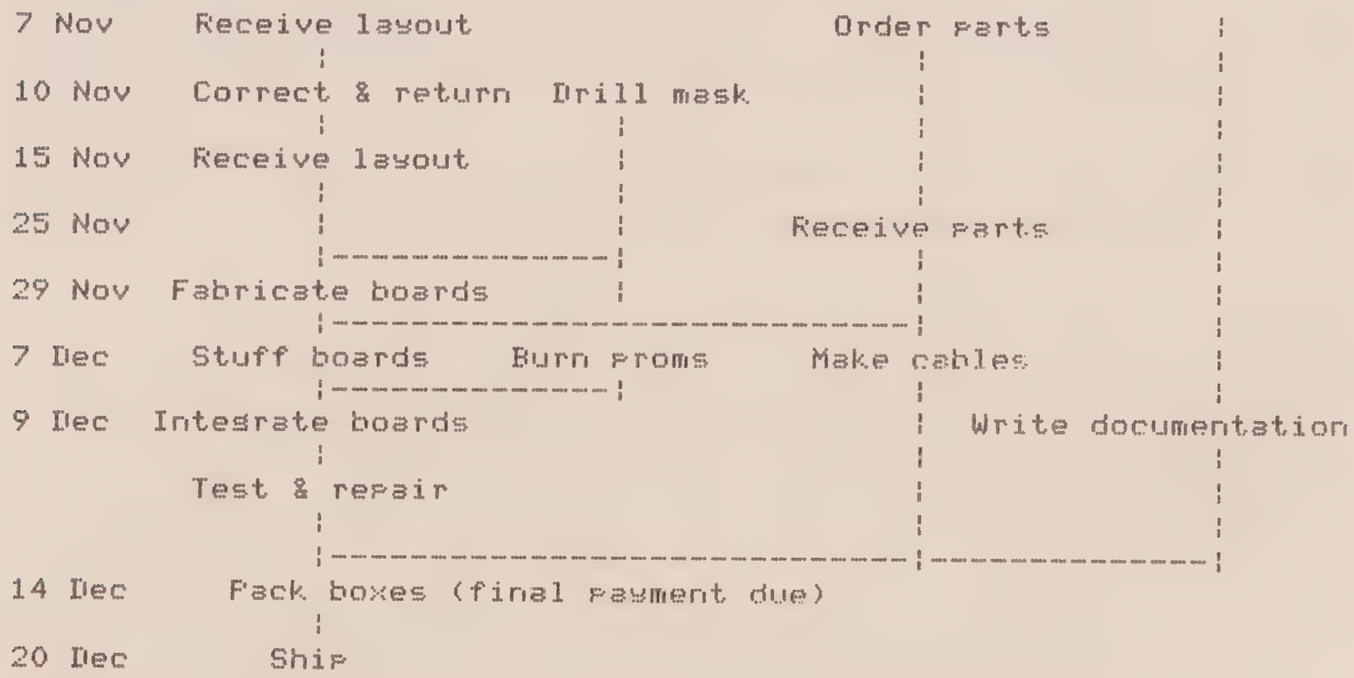
For both these reasons we are requesting a $50 non-refundable deposit for each TNC. Checks should be made out to Tucson Amateur Packet Radio or TAPR. Alternatively, any participant wishing to pre-pay our current estimated cost of $200 may do so with the understanding that no additional cost increases will be passed along to him. (We don't anticipate significant increases, but the exact cost will not be known until we have the final count on TNCs ordered.) The cut-off date for orders is November 7, just before

our parts order. Please inform your participants of this important information. As you do so, please bear in mind the following facts concerning Beta Test.

First, Beta Test is not a commercial venture. It is, rather, an experiment. For this reason, we ask that each participant ordering TNCs sign the statement below, indicating acceptance of the risks associated with participation in an experimental venture. We cannot adopt a "service what we sell" policy during Beta Test. The Beta Coordinator must ensure that there is an adequate base of technical support locally, to repair and modify the TNCs. This is why we have restricted the test distribution to sites indicating they have the local expertise to handle problems. Beta sites with fewer than four or five members may find it impossible to build a self-supporting group, and would be well advised to find more local support before getting further involved.

On the other hand, we will do everything in our power to ensure shipment of functioning TNCs. We take great pride in our work, and intend to have the fewest possible problems during Beta Test. It is our policy that we will give you, the Beta Coordinator, as much support as possible. If you run into a problem you can't handle without our help, please call us or one of the other people in the local group. But bear in mind that for us and for the rest of the group involved in getting Beta Test out the door, packet radio must remain a hobby, taking second place to making a living (sigh).

Here is the schedule we anticipate. Please note that the dates are approximate. If problems arise at some point the result will be some slippage.



Assuming parts are ordered according to this schedule, the vendors will need to be paid no later than December 15. Therefore, your participants should plan on completing payment prior to this date.

Thanks very much for your interest and assistance. Your efforts will help to make packet radio the success so many have believed it to be capable of.

73,

Den KD2S and Dan KV7B

DISCLAIMER

In supplying components and printed circuit boards for the TAPR Terminal Node Controller, neither Tucson Amateur Packet Radio nor any of its members make any representations or warranties as to its functionality in any particular situation. There is no warranty expressed or implied. There is no committment to supply parts for the board, software for it, or service for it. Availability and price are subject to change without notice. TAPR is not responsible for damage to the user's attached equipment.

ACKNOWLEDGMENT

I hereby acknowledge that I have read and understand the above disclaimer, and I agree to the above and hereby release Tucson Amateur Packet Radio, its officers and members from any liabilities related to the materials purchased.

signature:_____ date:_____

(Note added: Since we must convince the IRS that we are a non-profit corporation, this and all further releases of TNC and other hardware will not be sold for profit. Rather, it will be available solely to TAPR members who are interested in engaging in experimentation with other TAPR and non-TAPR members.)

TO: HM
FROM: TC
SENT: 25 OCT 82 13:51:44
READ: 25 OCT 82 16:36:02

Hank,

tnx for reply on the document. Den and I have re-written the PACSAT section and I'll forward it to y'all vy soon. N5AHD and I ran a total of nearly 3 hours of pavkets on 10m this weekend, with K8MMO acting as SWL. Dave plans to be ready to xmit by next weekend. I think that the 10m tests are relevant to the AMICON planning 'cuz we are working on a fading and QRM-filled channel. Still it wrkd well except the blankety-blank M03 software seems to keep eating pointers or stack or sumthin'. After abt 10-20 minutes, things disconnect themselves and TNC goes into a state of catatonia. Has anyone ever found what the problem is? I'm sure it's happened to others and that the Washington area ROM clones aren't unique.

73,tom

TO: Tom, W3IWI
FM: Hank, KA6M

Glad to hear you're having such good luck on ten. I wouldn't have expected it. That band used to be my favorite in high school, and brings back many memories. I have no HF equipment at the moment, unfortunately.

I know of only one error situation in the TIP03 software which could cause a major crash. If the input data overruns the buffer in disconnected mode, there is not a failsafe interlock on the buffer ring pointers. Usually this can only happen if one of the TNC's is connected to a computer, which can generate lotsa lines in no time. A typical scenario is that the computer is sending out a long file, and the transmit buffer is full, and then a problem on the link causes the boards to disconnect after 32 retries on the channel. The TIP goes into disconnected mode, the computer is given a Control-Q, and a wrap-around occurs which is not provided for in the code. You can eliminate this problem by having the TIP discard any lines of text it receives if it is not connected. I didn't see any easy way to to throttle back the host in disconnected state.

I've also seen VADCG's go crazy if they are not properly shielded. Very strange stuff can happen if RF gets into the board. Any VADCG that is not mounted in a metal box with RF filtering is suspect.

Hope that might help you resolve the problem. Keep up the good work.

73, Hank

TO: WW
FROM: TK
SENT: 25 OCT 85 18:31:44
PAGE: 25 OCT 85 18:58:02

...for people on the document. Dan and I have rewritten the PASSWT section and I'll forward it to you soon. MSWHO and I per a total of possible 3 hours of revisits on JOB this weekend, with KSMMO coding as SWL. Have plans to be ready to xmit by next weekend. I think that the JOS tasks are relevant to the PATTON project. You're are working on a feature and DQM filled channel. This it work well except the bidirectional 40X software seems to loose setting pointers or stack or something. After abt 30-50 inputs, comms disconnect themselves and TWC sees info e state of columns, the source ever found what the problem is. I'm sure it's because to attend to the Washington area DQM clears error/t unique.

TO: WW
FROM: TK

Also, I've been having such good luck on Dan, I wouldn't have expected it. That used used to be low (avoid to high school- and brings back many memories. I have to WE assignment at the moment, unfortunately.

I know of only one error situation in the TIP03 software which could cause a minor crash. If the input does overruns the buffer in disconnected mode. There is not a failsafe interlock on the buffer ring pointers. Usually this can only happen if one of the TWG's is connected to a computer, which can generate lines in no time, a typical scenario is when the computer is sending out a long file, and the transmit buffer is full, and then a problem on the TIP causes the parade to disconnect after 32 returns on the channel. The TIP goes into disconnected mode, the computer is given a (control-Q, and a keep-around occurs which is not provided for in the case. You can eliminate this problem by having the TIP discard any lines to the host it receives if it is not connected. I didn't see any easy way to throttle back the host in disconnected state.

It's also seen UCDCB's so crazy if they are not properly shielded. Very obvious short can happen if RF gets into the board. Any VADCC that is not mounted in a metal box with RF filtering is suspect.

Hope that might help you resolve the problem. Keep up the good work

Hank,

Do you know anything about tiptt/liptt; i.e. do they have anything new? I don't know about the Cless deal, as it would appear that 220 is growing in popularity; & why would anyone want to dump an entire stock at such a low price, if it wasn't "the bottom of the barrell(sp)".

I am honored that you would like to have me help construct the ground-station, and I agree with your approach totally. Why spend the time, effort and labor, when it "ain't there yet". I would also be willing to fool around with packet voice & TV as well in the meantime, that is, nothing else is happening. Sorry about the typo's... I am trying to increase my typing speed.

One other thing, would it make sense to have a ^F inserted after every character in a local connect mode?

>or something like it (like RTTY)<?

73, best
=cas=

TO: HM
FROM: SER
SENT: 24 OCT 82 14:55:38
READ: 24 OCT 82 15:47:39

Hank,

Cless still has the riss (some partially completed), but wants to sell the entire warehouse of parts + some test equipment. This is not for general knowledge, but he would accept $3000 for everything.

I don't see any way of doing this, but will entertain suggestions. If you think all groups can pool resources, I'll send along a copy of the inventory...

73, Steve

TO: HM
FROM: JS
SENT: 21 OCT 82 07:07:32
READ: 21 OCT 82 16:35:50

To All PRNET,

It has just been pointed out to me that my rendition of the VADCG parts order form is very confusing. The 'RS232 parts kit' contains everything required to populate a board, including PROM, RAM, 8250, 8273, connectors, sockets, etc. There is 4k ROM and 2k RAM.

Thus a populated board will cost only $30 + $117 = $147 U.S. in kit form. This includes VE7CVS's version of the LIPTT and TIPTT if you give the defaults needed (callsign, etc.).

The separate listings for individual ICs is for those who need only those parts. Hopefully we did not discourage anyone permanently from getting involved in Packet Radio.

73 es cul
John, VE7ADE

Welcome Back!!!
    The new information looks promising.... maybe Santa will brins me everythins I need to talk to the satellite... (chuckle)... I have been very busy up here (spent 16 hours in front of the terminal yesterday + nine today)... etc. finishins a "CONSLT.JOB". Anyway.. hope to see you Wed. 73, =cas=

QST DE W3IWI

News Release on Packet Radio Activities
de AMSAT 16 October 82

*** Long-haul Packet Test Successful ***

On 16 October 1982, from 16:45 UT until 17:00 UT, a successful long-haul Packet Radio demonstration QSO took place between Maryland and Texas; the stations involved were Bob Diersing, N5AHD in Corpus Christi and Tom Clark, W3IWI near Washington. The QSO took place on the 10 meter band at 28.300 kHz with both stations running FSK at a 1200 baud rate using HDLC protocol currently accepted as amateur radio standards.

This demonstration represents another phase of the AMSAT activities to advance the state-of-the-art in amateur radio communications technology development and the tests were conducted to test the suitability of various existing hardware and protocols under weak-signal and QRM conditions in anticipation of the AMSAT Phase-3B satellite launch in February, 1983, and to help in the planning of future satellite missions including a possible dedicated packet radio mission a few years from now.

The demonstration QSO took place just one week after a landmark meeting held under AMSAT's auspices to establish and coordinate common packet radio protocols. This meeting in the Washington,DC area was attended by representatives of packet radio groups from San Francisco, Tucson, St. Louis, Washington and New Jersey. The meeting succeeded in reconciling minor differences that had evolved between the various groups during their R&D activities. The goal of establishing common protocols was focused on the upcoming satellite launches when it will be possible, for the first time, for the different packet radio groups to reliably inter-connect local networks on a global basis.

During the long-haul test, both N5AHD and W3IWI were using special 8085 microprocessor based Terminal Node Controller (TNC) hardware developed in Canada by the Vancouver Area Digital Group (VADG), with software developed in Vancouver, San Francisco and Washington. They both used conventional "202A" FSK modems operating thru 100 watt SSB transceivers. A number of packets were successfully exchanged in both directions and the TNC board's software automatically verified the accuracy of each transmission. The HDLC protocol dictates that if any error is detected, the transmitting station re-tries until an error-free copy is received. In the test QSO, the number of re-tries required never exceeded three. The stations had conducted previous long-haul test experiments through the AMSAT-OSCAR-8 satellite.

W3IWI has been involved in a number of previous AMSAT demonstration tests including initial feasibility demonstrations using satellites to locate downed aircraft which led to the international Search-and-Rescue Satellite (SARSAT) program and tests of digital phase-shift keying (PSK) techniques to be employed on the Phase 3 satellite series. N5AHD has developed automated, real time telemetry acquisition techniques for the UoSAT-OSCAR 9 satellite and operates AMSAT's Computer Bulletin Board System (CBBS) which can be accessed at (512)852-8194. Both N5AHD and W3IWI have been frequent contributors of amateur

radio software which is available throush the AMSAT Software Exchanse (ASE). Further information about AMSAT, ASE or AMSAT's CBBS can be obtained by callins the CBBS or by writins:

AMSAT
Box 27
Washinston, DC 20044

. . . - . -

radio software which is available throush the AMSAT Software Exchanse (ASE). Further information about AMSAT, ASE or AMSAT's CBBS can be obtained by callins the CBBS or by writins:

AMSAT
Box 27
Washinston, DC 20044

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To: All Packet Stations
From: Hank Magnuski, KA6M
Date: 12 October 1892

Special to AMSAT Satellite Report -- de Hank Magnuski, KA6M

NATIONAL AGREEMENT ON PACKET RADIO STANDARDS!

As part of the October 10th, 1982 AMSAT (Amateur Satellite Corp.) general meeting, president Tom Clark, W3IWI, invited a number of leaders of active packet radio groups to come to a special working committee meeting on Friday, October 8th, to discuss the future development of AMICON, the AMSAT International Computer Network, and a new project tentatively called PACSAT I, a low-altitude orbit, all digital store-and-forward transponder. To Tom's great surprise, a number of people showed up, representing these groups: New Jersey - Phil Karn, KA9Q; Tuscon Area Packet Radio (TAPR) - Den Connors, KD2S and Lyle Johnson, WA7GXD; St. Louis Area Packet Radio (SLAPR) - Pete Eston, WB9FLW; AMRAD (a bis WAPR) - Paul Rinaldo, W4RI, Dave Borden, K8MMO, Terry Fox, WB4JFI, Bob Carpenter, W3OTC, and Eric Scace, K3NA; the Pacific Packet Radio Society - Hank Magnuski, KA6M; AMSAT - Tom Clark, W3IWI, and Jan King, W3GEY.

Even more surprising is that this diverse group managed to agree on some things. In fact, the agreement reached on adopting a common link level protocol may prove to be extremely significant in forming the foundation for U.S. packet radio networking. The meeting which originally was supposed to iron out some AMICON details managed to have much more of an impact. Here's some background on what happened:

A year ago, in conJunction with the '81 AMSAT general meeting, Paul Rinaldo organized the first Packet Radio Networking Conference which was held at the NBS in Washington (some excellent conference proceedings are still available). Many ideas and some real and paper networks were discussed. In the months which followed quite a few people got their packet radio controllers running and had a chance to experiment, read, discuss and think about various problems involved in implementing PR networking. The situation became discouraging. It seemed like a new protocol was proposed for each TNC that came on the air. Each group started heading off in a different direction. The promise of compatible systems grew remote.

But in this dispersion of effort people also found out how difficult it was to implement private protocols and how difficult the interconnection would be if common ground wasn't found. The different groups also came to realize that there was a common set of problems to be solved and that one area's solution couldn't ignore the requirements of other users. The summer doldrums [illegible] very little activity and not much progress, and provided the background for the AMSAT meeting.

The AMICON Network

Two major areas of concern filled the agenda of the AMICON meeting: the modulation method to be used for the Phase IIIB special service digital channel, and the protocol to be used for linking two ground stations via the satellite.

There was a lot of discussion on the modulation method, and Den Connors and Lyle Johnson of TAPR and Paul Rinaldo of AMRAD presented their research findings. Many different modem types were reviewed and international requirements were discussed. After all the debate the following conclusions

radio software which is available throush the AMSAT Software Exchanse (ASE). Further information about AMSAT, ASE or AMSAT's CBBS can be obtained by callins the CBBS or by writins:

AMSAT
Box 27
Washinston, DC 20044

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were reached:

1. The L1 SSC will be restricted to 5 kHz bandwidth (at the 26 dB points). Modem performance is a primary consideration for a groundstation, and the modem used will probably be of a fairly advanced design.

2. The use of 202 modems using NBFM-AFSK will not work.

3. The use of 202 modems using SSB-FSK will produce marginal results.

4. A 1200 bps channel speed is probably optimal, as this speed satisfies a variety of different constraints and requirements.

5. The BPSK modulation method developed for IIIB telemetry should be explored at both 400 and 1200 bps.

6. The AMRAD and TAPR groups are going to pursue development of a modem which employs Minimum Shift Keying (MSK). MSK is the considered the most promising method at this time.

. The SSC will have to be open for different experimental approaches until there is general agreement and experimental validation of "the" method.

Considering all the alternatives which were discarded, the above resolutions represent a significant narrowing of focus. If that wasn't enough, more was yet to come!

Eric Scace reviewed the work which had been done by the NJ & AMRAD packeteers to adapt the international X.25 protocol to amateur needs. The amateur subset has been documented by Terry Fox, and is now called AX.25. Hank Magnuski distributed a tutorial document on connectionless protocols and described work which had been done to develop Revision 4 of the TIPM and LIPM software. This is the first implementation of software utilizing amateur calls only for addressing.

By the evening of the 8th the group began to recognize that only minor differences separated the AX.25 and LIPM.04/TIPM.04 approaches. The TAPR protocol users were willing to implement an interface based on the recommendations which would come out of the meeting. The differences were resolved and led to the unanimous adoption of a subset of an internationally recognized link level protocol (specifically, ANSI X3.66 ADCCP-HDLC BA Class, with options 2, 4, 7, 8, & 11).

Why is this important? First, this link level protocol allows two AMICON groundstations to construct a packet pipeline. This same protocol can be used between two stations in a terrestrial backbone net. The same protocol can be used terminal-to-terminal and terminal-to-terminal via a simplex packet repeater. It is a slight extension of the X.25 LAPB link level protocol. Finally, it does not restrict future development of ISO Level 3 virtual circuit or datagram protocols.

The key feature of the new design is the adoption of a scheme for using call-sign addressing in a packet. The packet format looks like this:

where:

FLAG Standard opening HDLC flag byte (01111110)

radio software which is available throush the AMSAT Software Exchanse (ASE). Further information about AMSAT, ASE or AMSAT's CBBS can be obtained by callins the CBBS or by writins:

AMSAT
Box 27
Washinston, DC 20044

. . . - . -

TOCALL	The destination call-sign and SSID (Secondary Station Identifier)
FMCALL	The source call-sign and SSID
CTL	Standard HDLC control byte
PID	Protocol identification byte for information frames.
INFO	Information field in information frames
FCS	Frame check sequence
FLAG	Closing flag byte

Frames to be repeated by a local area network simplex packet repeater also contain a third address field following the FMCALL field. This third field is the callsign of the repeater. More details on this protocol will be published in the revised AX.25 document.

Collectively, the group considered nearly every design which starts out with a statement something like this: "Holy 807's, look at all the overhead bytes you have in using call sign addressing. I can do it with just 4 bits." We have found that these other schemes have their own defects and that the penalty for the call sign overhead is relatively small in comparison to other delays on the link and in view of the other benefits.

The AMICON session ended with promises from various members to try to implement the required versions of this new protocol. In the interim, LIPM.04/TIPM.04 will be used by AMICON groundstations until the new software is ready.

Tom Clark described a potential opportunity in the late '84 timeframe for a new for a new low-altitude orbital launch. Tom reviewed various considerations which led to the concept of building a satellite which would be an all digital store-and-forward transponder - a flying mailbox. This satellite would have a computer, two or more digital serial I/O channels, appropriate modems, and 1/2 to 1 megabytes of on-board memory. Messages put in on one side of the earth could be extracted on the other side. The operation would be somewhat like using a CBBS, but only for 15 minutes at a time!

Tom proposed a preliminary design, and there was an extended discussion of the pro's and con's of the project. Various implementation ideas were suggested. Dan Connors and Lyle Johnson agreed to put together a more detailed PACSAT proposal for Saturday, and presented it at a seminar on the 9th.

The project concept was presented at the AMSAT general meeting, and since no opposition was raised, further development of the PACSAT proposal is expected.

TO: HM
FROM: DC
SENT: 15 OCT 82 17:37:54
READ: 15 OCT 82 18:09:53

Tucson Amateur Packet Radio Activities
by Den Connors KD2S and Lyle Johnson WA7GXD

TAPR is back from a very hot summer, and we're readying for an onslaught of activity in an expanded number of Beta sites. As background, the summer found us switching the processor on our Terminal Node Controller board from a 6502 to the more powerful 6809, to allow for software protocol implementations using concurrent or multi-tasking systems. There are now three different groups working on software, with Lyle WA7GXD building up system primitives in assembler, and constructing a fully-compatible VADCG LIPM04-type protocol. This first effort for hardware testing allows us to use Lyle's Vancouver boards in both station and repeater modes.

Marc Chamberlin WA7PXW and Dave McClain N7AIG are finishing the FORTH dynamic-addressing experiment. Dave finished the 6809 target compiler for his Apple system, and Marc is rewriting the code he generated on the Point 4 TNC simulator to be compatible, and run on, the Apple. They hope to have this experiment on the air this fall.

Elsewhere is this newsletter you'll find a report on protocol standardization which occurred at the special AMSAT packet radio meeting held in the first week of October. TAPR was represented by Den and Lyle, was in complete agreement on the resulting "AMSAT standard". To this end, Margaret Morrison KV7D has embarked on an implementation, from scratch, of this protocol. Using 6809 assembler and PASCAL (UCSD standard), Margaret is targeting a fall release. The development system is a combination of DEC-10, VAX running VMS and H.P. 64000 workstations... talk about the classy way to get things done!

We are now working on a target delivery to Beta sites of TNC's next month, but we've learned to keep our mouths shut about promises and due dates. The St. Louis group (SLAPR), ably led by Pete Eaton WB9FLW and Bill Reed WD0ETZ, have taken the task and responsibility of having the Beta schematic turned into a layout within the next three weeks, and have also found the mythical "custom [illegible]" that makes installing a working TNC no more difficult than opening up the packing box and putting cables back on, installing a radio-dependent plug on the RF interface cable and trying it out. We hope Beta site coordinators will help in the integration of hardware for their areas. Final prices for complete packages will be sent to coordinators very soon; I think we're all in for a very pleasant surprise, due to some dogged arm-twisting by Lyle.

For a little more information on what Lyle and the hardware group have been doing this summer, read on...

The major problem faced in initial experiments with our Alpha TNC's was with the modem radio interface. The TNC ran well at 600baud, but balked at 1200. Plots were made of the audio response of the entire system, and the reduced by the team of Morrison and Morrison (KV7B & D). The result was a FORTRAN program to optimize the design of a switched capacitor active filter using the National MF-10CN filter I.C. After a couple of passes, a sucessful design was made operational, and was tested with numerous radio combinations (courtesy of WA7GXD, KD2S, KV7B, KV7D and NOADI) with favorable results. A warning though.. beware of attempting to operate a packet station with a transceiver that has appreciable levels of second-harmonic distortion. An initial investigation indicated problems with the ICOM IC-211 and the

Kenwood TM-[illegible]A.

The CWID circuitry works well now (see the last issue of the PSR) and teh transmitter keying circuitry w/ lockout worked fine for all radios tested A 6809 adapter manufactured by MMS, Inc. here in Tucson was sucessfully interfaced to the TNC, replacing the 6502. This modification allows the Alpha boards (made so long ago) to use the same code being developed for the Beta boards.

Although the Alpha test has given boards that work talking to each other over the air, no test protocol has yet been written to test them in a NETWORK confisuration. So the Hardware group is temporarily playing software group as well, coming up with both the TNC interrupt drivers for all of the on-board I.C.'s (less the parallel port, for Alpha), and sufficient assembler code to operate with Lyle's two VADCG boards, one using the AMRAD repeater protocol, and the other acting as another station on the net. This gives us both a good test of all software, and a proper test of compatibility with all of the VADCG boards already out in the field.

Our coordination efforts within TAPR have been horrendous, with close to 180 members in over 25 states and four countries as of this writing. We have been simply inundated with requests for information, and have not only missed some of those requests, but have messed up getting information out to our own members! Although we're doing what we can to keep outsiders informed, I would urge anyone with an interest in what TAPR is doing to become a member for just one year, at $12. The President's office has just taken over handling requests, complaints etc., and will be very responsive to other people's needs.

Please send requests for information, membership requests and the like to

Tucson [illegible]
P.O. Box [illegible]
Tucson, AZ 85734

[illegible]

Date: October 12, 1982
To: All Interested Packet Stations
From: N6ECT, Curtis

Subject: PR Docket No. 81-699 Use of Additional Digital Codes
RM-3788 in the [illegible] Radio Service

I have begun to enter the above FCC Docket on this system. It is listed under DOCS and can be read complete by typing [illegible] ADC.DOC+ . I will be entering this long piece in stages, and will enter an INDEX QST upon completion.

[illegible]

[illegible]:PACKET:QST_FM_N6EC[illegible]CT.04A

Date: October 04, 1982 15:45 PDT
From: N6ECT@PPRS "Curtis"
To: All Interested Packeteers

[illegible]t: S.F. CommuniTree, Flagship?

[illegible] Communitree in San Francisco, (415) 661-6477, is no longer [illegible]ing an amateur radio branch. seems as if the folks there have gone into other things. As it stands now, there are no amateur radio related BBSs in Northern California; at least for a while. -cas-

Date: October 04, 1982 15:10 PDT
From: N6ECT, "Curtis", -cas-/=cas=/cspans@mit-ai/bliv,-cas-@mit-oz
N6ECTterms
To: All Interested Packeteers

Subject: Calls Logged PFRS-DG August/September

CALLS LOGGED AUGUST

Total Calls = 117
Calls via radio = 48
Active = N6ECT, W6RAW, W6JHJ, KA6NAN, WA6JFZ, N6FQR, WA6SLF
[illegible]
Total Active = 15

CALLS LOGGED SEPTEMBER

[illegible]
Calls via radio = 41
Active = N6ECT, W6JHJ, KA6NAN, N6FQR, KD6LI, WA6JFZ, [illegible]
WB2GDQ, N6GJH, K6HWJ, KA6M, W6BB, NJ6A, WA6SLF
KA6ETJ
Total Active = 15

[illegible] 26-SEP-82 21:[illegible]

TO: HM
[illegible] DC
SENT: 25 SEP 82 19:[illegible]
READ: [illegible] SEP 82 04:[illegible]

Paul,

[illegible] for your willingness to publish the TAPR report. I [illegible] be able to relase same until tonisht. If that fits in with [illegible] schedule, fine. Otherwise, I'll understand. We've besun a new effort here to finish [illegible] the hardware and software "on schedule", but the [illegible] issues of the sroup [illegible] in the last many weeks. Lyle is writins assembler interrupt for the 6809, while Marsaret and several of us are [illegible] to be writins all aspects of the TAPR protocol in Pascal, and offerins some level of finish thes to all interested parties, in hopes they will try other [illegible] interface ideas. (Talk to Dave and Terry... will they write the AX.25 [illegible] onto a 6809 TNC? Gordon has already promised to write the AX.25 interface code to sit on the top of the TAPR protocol.)

I'll brins all hardware and software developed to date with me when Lyle and I see at the AMSAT meetinss. I'll drop off a [illegible] of either the [illegible] systems boards when I see you there.

Please [illegible] for more here tonight.

73, [illegible]

[illegible]: HM
[illegible]: [illegible]
[illegible]: 18 SEP 82 1[illegible]
[illegible]: 19 SEP 82 04[illegible]

TO : All
SUBJ: FCC Approves Additional Digital Codes

Below is some news as it will appear in the October 1982 issue of QEX:

On September 14, 1982, the Federal Communications Commission (FCC) approved Docket 81-699 (proposed rule making to allow additional digital codes in the Amateur Radio Service). When this item came up, Commissioner Henry Rivera asked whether mention of enforcement in the document before them indicated any unresolved concern on the part of the FCC staff. The answer was that the document simply repeated some of the wordings used in the notice of proposed rule making and that everyone realized that the FCC would not be able to monitor all digital transmissions for message content. Chairman Fowler asked if off-the-air sample recordings of unreadable transmissions could be made for later analysis and whether the amateur station could be requested to furnish the information which would allow the FCC to decode the message. Field Operations Bureau Chief, Richard Smith answered "yes." Private Radio Bureau Chief, James McKinney pointed out that the rule change applies to vhf frequencies which propagate more or less line of sight. Also the FCC has the right to close down any offending station. He said that the Amateur Radio Service has an excellent record of self policing. All of this happened in less than ten minutes.

This action is in response to a petition by the ARRL to amend section 97.69 of the FCC rules to permit the use of new and experimental digital processes by radio amateurs. (See "Happenings" in the December 1981 QST.) Currently, the only digital (RTTY) codes authorized for amateur use are ASCII and Baudot.

I do not know exactly what the new rules will say because they are not released until they appear in the Federal Register. But I have a pretty good idea. It will permit the use of any type of digital code above 50 MHz for domestic communications only (also probably to Canada and Mexico if they agree). Stations will still need to identify using voice or cw and will need to maintain a log of the codes used and furnish that information to the FCC upon request.

The original petition by the ARRL requested increase of permissible speed from 1200 to 4800 baud between 50 and 225 MHz. The FCC's notice of proposed rule making proposed that sending speeds up to 19.6 kb/s may be used on ASCII (unspecified speed on additional digital codes) so long as the bandwidth did not exceed 16 kHz. Comments filed by AMRAD suggested that the speed (particularly in the 220-MHz band) be raised to 56 kb/s and that bandwidth be increased to 100 kHz. The Leasue filed comments in support of this and a similar request by Paul Newland, AD7I to raise the limits above 420 MHz. So, at QEX press time, we have to say that we don't know the speed limits in the new rules. But we should know within a few days.

The maximum bandwidth and/or speed is particularly important in the development of a packet radio backbone network (internet) which will connect between cities. If it is too slow, the network trunks will not have enough capacity to handle peak traffic loads.

At this point, if the new rules were effective tomorrow, we would have a difficult time finding high-speed modems. Someone's rule of thumb said that modems above 1200 cost something like a buck a baud. Today's competition seems to be driving the commercial ones down to about half that. Even at that, the price is awful and will drive us to home-brewing. Among those of us who have been discussing high-speed modems, there is no agreement (yet) on the best type of modulation to be used. Leading candidates are: msk (minimum-shift keying where the shift in Hz is half the baud rate) and qpsk (quadinary phase-shift keying).

Packet radio experimenters with Vancouver terminal node controller (TNC) boards have been using non-return-to-zero inverted (NRZI) encoding. NRZI is no longer considered to be state of the art in the computer industry and is being replaced by others such as Manchester and Miller encoding for magnetic storage media. One characteristic of some of the more sophisticated encoding schemes is ensuring of changes of state often enough that the dc component is eliminated. Bob Carpenter, W3OTC, raised the possibility that the right encoding scheme could permit transmission of data without a modem by feeding the data stream directly into the microphone input of a transceiver.

The FCC action clears the air for us to experiment, at least above 50 MHz, with forward error correcting (FEC) codes. There hasn't been a pressing need for them to date in the handful of amateur packet radio networks in North America which are mostly local in coverage. High-speed inter-city paths which are long enough to encounter fading on vhf could be good test beds for certain types of error-correcting codes.

Docket 81-699 applies only to 50 MHz and above. It will not change the situation on hf where we are currently limited to Baudot and ASCII codes. The League has petitioned the FCC to permit "AMTOR" transmissions in the hf bands. That petition has been designated RM-4122. (For details see QST August, 1982.) At the moment, AMTOR is in competition with Docket 82-83 (NOI/NPRM for phone subband expansion, see September, 1982 QST, p.10) for FCC time. Because of the present FCC backlog and finite resources for handling rules changes, other hf data communications experimentation should go the special temporary authority (STA) route for now. A permanent rule change affecting the hf bands is a more complicated procedure than at vhf and above because the signals easily propagate outside the U.S. This makes it necessary for the FCC to be careful that international treaties and ITU regulations are observed.

As you may have heard, the President signed into law certain changes to the Communications Act of 1934 which included those requested by the League. That happened the evening of September 13. If that followed in less than 24 hours with the FCC passing Docket 81-699 doesn't signal a new ball game for Amateur Radio, tell me about it.

73, Paul, W4RI

TO: HM
FROM: WWP
SENT: 16 SEP 82 17:01:37
RCVD: 16 SEP 82 21:21:12

To All:

I need a good reference for design of Step Recovery Diode (SRD) multipliers I'm interested in constructing a 5X multiplier 460 MHz in 2.3 GHz out.

If someone knows of a good text on the subject or has some experance with SRD's or multipliers please let me know.

73, Bill Putney

To: All amateur satellite publications

From: Robert J. Diersing, N5AHD
4129 Montego
Corpus Christi, Texas 78411

Date: September 8th, 1982

Subj: Transmission and reception of digital packet data via Amsat-Oscar-8, amateur radio satellite

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In recent weeks, Dr. Tom Clark, W3IWI, of AMSAT and myself decided to begin testing the feasibility of transmitting and receiving packet radio data via satellite. We are both using the Terminal Node Controller (TNC) boards produced by the Vancouver Amateur Digital Communications Group (VADCG). Software was supplied by AMRAD, originally written by Doug Lockhart, VE7APU, and modified a great deal by AMRAD.

After several unsuccessful attempts to receive connect sequences from Tom via mode A we decided to abandon the two-way attempt and I would try to receive my own data. Since I already had three TNCs and two 1200 baud modems available, I would try sending QST packets and receiving them on another system. A small software modification had to be made such that the QST message and CW id were transmitted continuously rather than at 9 minute intervals as allowed by the original software. Better audio matching between modems and radios was also incorporated and testing resumed.

After several unsuccessful attempts, on September 1, 1982, 01:10 UTC, (an experimental day) orbit number 22887 mode J (or possibly AJ since I was not listening on mode A), digital packet data was transmitted and received at N5AHD. In some cases, the three line QST message was partially received and in others it was complete. The mode of transmission was NBFM in the middle of the satellite Mode J passband. At any time the signal was good quieting and the tuning for zero discriminator reading maintained, the copy was successful. No tests on SSB were made during the orbit.

Later, on September 6, 1982, 14:00 UTC, orbit number 22938, with satellite in mode J, several more successful receptions were made this time via SSB. The tuning in this mode was much more difficult which was expected. The number of complete packets received was much lower than when using NBFM probably due mainly to the better tuning indicator via the discriminator meter.

Needless to say, much more testing is planned and the results of those tests will be documented. This first iteration was simply to get HDLC packet data through an amateur satellite in low orbit successfully.

Hi Hank;

This oral surgery thing has been quite an adventure, with complications. I have another date with the surgenon this afternoon. If there is any kind of meeting; I can be delivered, although, I have been quite [illegible]

In any case.... here's hoping that you and your family have a nice holiday. If everything goes well today, I might be able to get on the air later.... How bout 73 best & HI to Cindy Sarah & Nick

Dear Packeteers:

In keeping with the amateur habit of free exchange I have been given permission to hand out the password for the San Francisco Flexnet Communities. The phone number is (415) 861-6489 and if you wish to enter data the password is bun-nyr . Normally there is a fee to others since this has become a "read-only" system. All amateurs may have the password at any time by contacting me. 73 & best N6ECT "Curtis" -cas-

Hi Hank!
Just a short note to let you know that I will be out of commission for about a week. I was in surgery friday ansd saturday...'oral".. & explotratory I am a little grossy and a bit in pain so excuse the prxx poor typing. Le Please keep me posted as to what is happening... 73 best -cas-

TO: HM
FROM: PLR
SENT: 10 APR 82 14:49:48
READ: 10 APR 82 16:47:37

I have no objection to receiving copy for the AMRAD Newsletter via this medium, provided that our benefactor doesn't mind. In fact, I would prefer it because I don't have to do the keyboarding, which takes time. In order for it to actually save time, I would ask that you format your copy as follows:

Begin all headings at left margin, use upper and lower case letters. I'll make them print bold when I edit with WordStar.

Set column width to 50. (I was using 43 but switched to 50 to save printing cost.) Don't pagination. Just make a continuous column.

Indent all major paragraphs 3 spaces, subparas 3 more. If you need the space on the line, for a table etc., go all the way to the left margin. Leave a line after each paragraph or subpara.

Use standard ARRL abbreviations found in the December 1981 issue of QST.

By going to electrical transmission, you should be able to wait a little longer before you have to wrap up your column. Also, because you are doing the keyboarding, you can use the deadline of the 10th of the month prior. I'll make a habit of checking into PRNET on the 10th.

Mike Parker called me from his motel. I invited him to our regular monthly meeting in Vienna, VA on Monday, April 5. I was pleased to meet him. I mentioned to him that I asked Bill Pala to change your copy of the Newsletter (and Lyle Johnson's as well) to priority mail rather than bulk. Delaying your deadline to the 10th and mailing your copy via priority mail should permit you to read the latest newsletter and react to it. I note that Chuck Green is not an AMRAD member -- can you urge him to join -- we can use the money -- we'll also send his copy via priority mail.

Re forming an official relationship between TAPR and AMRAD, I'm all for it and will respond separately.

73,
Paul, W4RI

Hank,

Thanks for your item on the Z8530. I'll slip it in the May AMRAD Newsletter, which I'm about to work on after finishing QEX.

Dave, Terry and I are going to meet with Eric Scace, K3NA today to talk over protocols, particularly addressing. Eric left NBS and now works for a sub of GTE Telenet. We'll try to get some input to you soon.

Dave is leaving for The Philippines on Sunday and will be gone a few weeks. So, Terry and I will try to pull together our comments.

73,
Paul, W4KI

HANK --

Is there a file that will list the various control codes ? If there is, please leave me a note with the name of the file. I just recently installed new eproms (but they are about 8 months old), and just have the few vital control codes (shift-control-hat C for connect) from Jeff.

Thanx,
de KA6NAN

Hi Hank:
I have sent the below messase to the steerins committee members.
"It is soon time for another steerins committee meetins. Let me know what days/time is best for you. Tnx 73 -cas-"
Let me know if you would like me to do a "Phone follow-up".
Have a nice weekend 73 and best to your family. -cas-

Hi Hank:
Re our conversation of this mornins; I feel that the seneral meetins should be held on the 14th of September....seeins that the first tuesday in Sept. falls the day after Labor Day, and everyone will probably be "partied out".

I would like to have the mailins out by at least the 7th; in any case. The steerins comittee meetins could be held between now and the meetins; the location could be at your convience. The last steerins meetins that I have recorded was 8 Feb 82.

On 12 Jan 1982 the followins steerins comittee members asreed too:

N6FTZ & WA6RZW	= by-laws PPRS
KA6M & GNU	= software
KD6LI	= hardware
WA6SLF	= mailbox
W6JHJ	= external affairs
N6ECT	= public relations

Steerins members could be called to arranse meetins.....

Let me know if you want me to make the calls.... 73, best & nice hearins from

Hank,

I will have to look up how to type to you from one channel to the next. I have a second note to VE3QB. I wonder if there is enoush interest in AMTOR on here to broadcast those exchanses? Thanks for passing the second message from Steve. I'll have to ask our guru what Steve misht mean by "mail losin" as that doesn't mean anythins to me at the moment. My personal losin name is "dna". That is probably what he wants. (Mail dna).

Asain, thanks. David N. Altekruse, w6raw.

Hank,

I haven't heard from you all summer. Possible explanations that occur to me include:

1. You have become extremely busy the past several months with work and family,

2. You are sick of packet radio,

3. You are mad at me,

4. You are testing the "group" to see if the packet seed will grow on its own now.

I left a note for Larry, VE3QB, yesterday, on the DG. I forget now .. if I just leave the note to him, (VE3QB_FM_W6RAW.AUG.10) will it "automatically" get to him, or do I send it through you?

The USENET system which AMPEX connected up with a couple weeks ago is quite active, has a lot of interesting items in it, and is a lot of fun. I talked with our local UNIX guru and his thought is that it would be extremely involved to connect up to USENET on a non-UNIX system. He feels it would be a lot easier to get UNIX up on running on the system.

A USENET system (as I understand it) typically receives messages several times a day. Messages then have an expiration date, usually two weeks. On our system there are around 2 megabytes of notes at any given time. A user has a file in his directory which indicates what "user-groups" he is interested in (which can be all of them), and what messages he has already seen.

It would be pretty easy for me to send selected newsgroups over to the DG on a regular basis. With a little work, I should be able to pretty much automate the process. If DG users were to indicate which of these newsgroups they were interested in, it seems possible to selectively "broadcast" USENET news.

The followins questions occur to me:

1. Are there enough DG-Packet users and is there enough interest to justify such a link? Perhaps there are already a number of users who have access to USENET either directly or via ARPANET?

2. Can the DG support a subset of USENET messages? This would probably mean .5 to 1 megabyte for 1/4 to 1/2 the newsgroups, and a huge number of directory entries and links if we were to use the "broadcast" idea. Some method of deleting old messages would have to be devised.

3. Would my idea of having selected broadcast lists work? Is it clear what I have in mind? Each DG user would indicate which newsgroups he is interested in, if any. There would then be separate broadcast lists for each newsgroup. As each DG user read each message, he would delete his link to that message.

If you think that this method of providing USENET to DG users would work, and would be of value, let me know and we can try it out for

awhile. A limited amount of traffic goins from DG to USENET could be handled here fairly easily.

-- David, W6RAW

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To: KA6M -- Hank Magnuski
From: WB2GDQ - Steve Gross
Re: Misc

Date: Aug 10, 1982

Hank,

I haven't gotten into the DG for a while because I have been very busy the passed couple of weeks. However, I noted that you logged into my system today, so I know that you are back from your vacation.

Can I stop by and pick up my UART some time? Should I go to your office or your home?

Where is your proposed header documented, I must have missed the message which contained or pointed to it.

I hope to get on the air in September.

Thanks muchly.
Steve, WB2GDQ

To: All packet stations
Fm: Hank Masnuski, KA6M
Date: August 10th, 1982

I have collected several responses to my short note about the new packet layout, and would like to pass them along to others. Thanks to all who supplied comments. I have not had time to formulate any responses to these suggestions.

73, Hank

FILE ka6m.fm.n6gJh

Hi Hank. It would be nice if you were to increase the size of the packet somewhat, if only to compensate for the additional overhead. My reason is somewhat selfish, but I'm sure that it would be important to other CP/M people: CP/M uses 128 byte records. When sending .COM files, it would be nice to be able to receive a record at a time, simplifying programming and allowing some of the hookups (like mine) to work without too much crap. Can the TNC handle it? How about just jacking it up to 256 bytes instead of 128, just to keep it power of two and allow for any new stuff we may do later, especially with weird routing codes or whatever. Anyway, just a thought. If you get this before you leave on your vacation, how about dropping a note re next packet meeting?

Talk to you later, Rick

FILE ka6m_fm_snu.Jul.10

Hi Hank, John here...
Just saw your message about new versions of LIP/TIP and repeater. Two brief reccommendations: first, a TIP feature which would have a bit table and/or a user settable timeout for packet transmission trisserings. The command ^^(would begin the list of delimiters ; thereafter each typed character would have a bits turned on in the(table of delimiters. ^^) would exit this mode. Thereeater whenever a character was keyed which had its bit on in this table, a packet would be sent. (This is the general case, user settable version of your KA6M** tests for colon, etc.) A third command such as ^^~ would clear the bit table . The timeout would be specified with a set of digits (followed by any nondigit) after a ^^t command (as in "^^t50 " to set the timeout to 50 tenths of a second). If any character has been keyed but no packet has been sent in that much time, the packet is sent on as-is. This is(the perferred delimiter method for computer output since it tends to come out in bursts, but with no fixed delimiters. Setting the timeout to zero would disable it. Note that the keyed characters can only be edited locally before the packet is sent, so such editing is unreliable when the timeout is set. This is usually OK if the remote system also implements simple backspace (or delete) editing. I don't know if TIP accepts both to do the same thing; it should. It should also transmit them if they are keyed at the beginning of a buffer (with no chars keyed) incase the previously sent text is now being rubbed out. Probably the timeout set by the user is good enough to kick out these rubouts from the input buffer; they don't need to be expedited.

>The second thing to consider is that, on very brief reading, your new format for headers does NOT make forwarding via a repeater transparent, possibley losing the ability to forward thru multiple repeaters, since al (all) packets transmitted from repeater A to repeater B, no matter who they

are ultimately for, must be sent with "A" and "R" in their fields. This takes up further space in, and requires, a higher level protocol to deal with routing. I suppose it's a good first step, I just hate to think of changing all those proms again later. Can you put a few RAM hooks into the system? That is, indirect subroutine calls thru a transfer vector in RAM which the ROM sets up at RESET and which can be patched to cause new things to occur, at those particular points in the processing that we thought of BEFORE we burned the ROMs. The corollary is a patch facility, which I think can safely require a computer on the other end (use binary images instead of typing in hex or something, for ease of implementation). Two commands would be required, one (probably ^^ followed by some control character) which would begin a download from the terminal side, followed by a 1-byte length, 2-byte address, and n-byte data, followed by normal text. The length is limited to 31 bytes so that if the user accidentally invokes this command, the length they supply would probably be invalid, if it was a space or alphabetic. The second command would enable (^^d for lack of a "TIP Reference card" to pick an unassigned letter) or disable (^^nd) downloading of packets with patches in them. A particular packet "Protocol" field, say 1, would invoke the patch code. The information field of the packet would contain an address, data, and checksum (simple 8 bit sum) of the patch. Checksum prevents random packets which are not truly intended as patch packets from passing . The data is just moved directly from the packet buffer into the specified destination. Care must be taken to move only the exact number of bytes specified, so it can be used to make "delicate" patches of 1 or 2 bytes in transfer vectors. The default state of the TIP/LIP should permit downloading; the repeater can be programmed at some point to periodically or on request transmit the current set of patches to implement the next level of protocol we design, and these can run< out of RAM on systems with old proms.

The transfer vector entries I can think of are:

Packet Received from 8273 in good shape

Packet ready to transmit to 8273 (with buffer space available to move it around, if it needs expanding. This probably means "Not in the interrupt routine").

Unknown command from TIP input (^^x where x undefined).

I believe we can already patch interrupt vectors as they are in RAM, yes? If not, indirect each interrut routine thru a RAM location so it can be paxx patched.

This will give much flexibility in future development without redistribution of proms. And will also correct the few outstanding complaints about TIP and solve a DG performance bug while adding a general feature. Wish I could do these myself but time and lack of equipment presses me to hope that you can find them pretty easy to slide in.

It has just occurred to me that I can make the Ron Cain Small-C compiler available on my Unix system at Sun, to generate 8080 assembler input from C programs (which can probably be debugged under Unix C for ease). Small C lacks quite a number of features from C, but is a useful subset, is public domain, and is being continuously enhanced by the general public (see Dr. Dobbs' Journal, where new updates to it tend to be published.)

I have it online at MIT and can download it.

Then if a packet system becomes available to be put online to the Unix system (and can reach the repeater from Santa Clara), it can be put up as a second host on the net, and can be used to do development and subsequent downloading into VADCG boards or later TAPR boards. The amazing professional[illegible] of the TAPR effor[illegible]ee! I hope they can keep up the time required to get their system totally out into the world.

I fisured it would take much lonser to set "turnkey" packet radio stations
out into the world; it still will, because of radio interfacins and
licensins requirements, but two major parts (hardware buildins and debussins
and cpu-modem purchase and connection) have been eliminated, or hopefully
soon will be. Maybe before another 2 years I can run a packet station.
(Tho actually at Sun I spend a lot of time around hardware people, and
have learned a lot...maybe could debus another bare board now. But
don't want to....have too much software that needs doins anyway. I can
wait for the turnkey stuff.

Keep in touch..... John Gilmore. work phone 408-748-9900, usually there.

FILE ka6m_fm_wa6jfz.Jul.15

Hank I Just recieved this throush a DL thousht you misht
be interested.
01932 00024 US
Date: 15 July 1982 12:27 pm EDT (Thursday)
From: Sewhuk.HENR
Subject: Re: Packet Radio Internals
In-Reply-to: Article-I.D.: houxc.225
To: HamRadio^.es
Reply-To: Sewhuk

Relay to decvax!harpo!npois!houxi!houxc!ad7i
and or Hank Magnuski but there is
a brain damaged mailer somewhere so hope this works.

I found some thinss that I think are really bad in your header format.

1) The FROM and TO fields are backwards. Why make your node filter
throush the FROM field first. You can more quickly determine if it is your
packet if the TO field is first.

2) Remove all, underscore, bold italics control information
from the header.

Why would any node want to know about that? It really simplifies the code of
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encapsulated in the information field, the consentins packeteers
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strip that out of the info field. Why clutter up that level with useless
information.
Makes more sense to me to put protocals in the info field, that way
you can experiment with new, improved protocals in the information field
without confusins your repeater/sateway nodes in the interim.

3) What is the 7th byte of the call?

I hope is it a socket number. I think that
maybe the callsisn fields should be variable lensth,
end each field wiht bit 7 set
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an inefficient way to do it, RADIX 50 would be better,
but ASCII is easier for sure.

If you want more info, my radio club in Buffalo has been thrashins out the
header format and repeater/user interface formats for a while now.

Let me know if you set this, I think sometimes one of your machines disest these messases without my acknowledsement or yours.

Dave

FILE ka6m_fm_n6far.Jul.15

Hank,

Here is a messase I sot from a fellow xeroxer back East. The discussion started when I (and some others) sent him your QST messase describins the new protocol. Ron sent you his initial messase. He is another where he sives some more of his ideas.

Bill

Date: 15 July 1982 4:18 pm EDT (Thursday)
From: Sewhuk.HENR
Subject: Re: Packet Radio Internals
In-reply-to: Danielson.pa's messase of 15-Jul-82 11:48:11 PDT (Thursday)
To: Danielson.pa
cc: Sewhuk, RBrown.pa

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With a format like that, which is a simple extension of what I have see so far, you can describe a routine throush a repeater. By appendins a letter to everyone's call you can even describe a path throush your own repeater. If you

think that you can set routing,
a repeater program, terminal interface programs
running all concurrently, my hats off to you.
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Mostly to shorten headers.
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connection without building all these "bass"/"kludges"
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In summary I see two issues that maybe getting confused:

1) The low level how do two people communicate to each other.
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places.

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long time until we reach the critical mass to address issue 2's problems. For
instance my "gateway" (N2GHG a possible name) could have the property of
looking through the info field for more routing stuff, latitude, longitude,
commands, etc. I don't see that coming 'til we blaze more trails and reach a
critical mass of users going.

Let me know what you think, what others think, I personally think that most of
what has been happened has been done on whim without looking far enough
into what you want to happen. No doubt their stuff works, why else would
they be pushing it",
but looking past that I see a potential can of worms forming.

Dave

P.S to Hank from Bill --
If you want to respond to Dave, just send me your response
and I will forward it him.

FILE ka6m.fm.wa6slf.Jul.17

HI HANK.

1. NEW TIP & LIP (WITH NEW PROTOCOL) - HAVE OPTIONAL
DISPLAY OF THE TO AND FROM CALL LETTERS (NICE TO HAVE IT
SOME TIMES AND NOT OTHERS.)

73. JEFF

TO: HM
FROM: LSK
SENT: 10 AUG 82 13:40:46
READ: 10 AUG 82 16:08:10

General Message
The project to be developed here in Ottawa for the 1982/83 season, and probably 83/84 as well will be a microprocessor based VHF METEOR SCATTER communications system. Planning for this has been underway since early this year and a test program will commence in early spring '83. Participation in other packet radio projects has been suspended for the duration.

To maintain contact with you (beyond this medium) I have just started to wire wrap up the AMTOR project on a card. Who else out there is using AMTOR? I need the ASSEMBLER listing for the 6802 G3PLX software - has anyone got the listing on this side of the ATLANTIC yet? Is anyone really on 14.076 with AMTOR ???? What activity is expected to grow using AMTOR - opinions will be appreciated.

David, W6RAW - Please QSP to your UNIX contacts - I would especially appreciate comments from W8SDZ.

Larry Kayser, VE3QR/WA3ZIA

Good Mornins Hank:

Thankyou for your reply. It sure was hot last week. This note can be regarded as another "BIG THANKYOU" for the work that you have done in setting packet radio up and runnins in the bay area. I must apologize for all the notes, as the must seem to be a "pain-in=" to you. Would you forsive my impatience once again, I will try to improve; but try to understand that if ist wasn't for packet radio, "at this time", there would be nothins for me in amateur radio. your friend -cas-

Hi Hank:

I have tried to call Woody, but the phone is disconnected. Could you let me know what is at hand?

73, best

-cas-

A couple weeks ago my company (AMPEX) connected up with USENET (Users' Network) which is a largely UNIX network throughout the United States and Canada. USENET is a logical network, sitting on top of several physical networks, including uucp, BLICN, Berknet, and the ARPANET. Sites on USENET include many universities, private companies and research organizations. Most of the members of USENET are either university Computer Science departments, or part of Bell Telephone Laboratories.

I don't know if it would be possible to directly link our packet system to USENET, perhaps through Hank's DG, but I thought there might be some news items from USENET of the past week or so that would be of interest which I have stored on the DG.

The first file is recent Ham Radio news. That file is "USENET".

The second file may be of interest to Heath users.
The file name is "HEATH".

Finally, there is quite a bit of interest in USENET on the 68000 CPU.
If you are interested in that, the filename is "68000".

Let me know if you have any comments or questions, or mail to pass on to the originators of the above messages.

--- David, W6RAW

Hi Hank:

Do you know what has happened to the repeater. I haven't been able to hear it for a few days. Is ist down for maintainence? Any news? Awaiting to hear from ????. S.(sure)H.(happy)I.(its)T.(thursday)....(chuckle)

73,best

-cas-

Hi Hank:
I haven't been able to access the DG via the repeater; anything down there? How's everything... hope to see you on the air soon. Hi to Cindy & Family...
73,best
-cas-

TO: All Interested Packeteers

FROM: N6ECT, Curtis

DATE: August 2, 1982

SUBJECT: Calls Logged July

There were 177 calls logged on KA6M** Packet Central for July

94 calls were logged via packet radio
83 calls were logged via telephone

There were 19 active stations

N6ECT, W6RAW, N6FQR, N6GJH, W6JHJ, WA6JFZ, KD6LI, WB2GDQ, K6HWJ, W6OCP, WB6SDE, K6VCO, GNU, WA6SLF, KA6ETJ, WB2HUT, WB6HJP, KA6M, N6CKV.

The five most active stations for the month of July were:

N6ECT, WA6JFZ, W6RAW, N6FQR, KD6LI

73 & BEST from N6ECT

Dear Packeteers:

The Pacific Packet Radio Society needs your input. What is new with you and packet radio? What would you like to see accomplished within our network? Is our current operation "user friendly" or is there a need for a better "human interface"? Do you need help or better instructions for using the DG Packet Central? Do you have questions about the VADCG TNC? Do you have complaints? For comments address to INPUT_FM_(your call).(date)

Your input is appreciated. de N6ECT "Curtis"

Hi Hank:
If you have a moment, please read my note to Stu. Any suggestions would be helpfull. K6VCO_FM_N6ECT.JUL.31 Have a good weekend.
73, best -cas-

Hi Hank:

Was wondering if you had a file of all the calls.logged since day one? If there is one, I would like access to it. I have been thinking about the possible steps we could take in expanding the Packet Network and anticipate being able to share these thoughts with you in the near future; perhaps its time for another steering committee meeting? Give me a call if you want to chat. Hi to Cindy, Nick, & Sarah!

73, best

-cas-

Hank please give me the name of a person in the Washington D>C>
area as I have a friend who is interested in packet radio there.
A name and phone number would be fine.
Thanks Ron.

Hi Again Hank:

Re the previous message; I discovered that the FM station that I called you about one time before, was doing it again to me. Seems like when this one DJ sets on he boosts the power, and I get QRMed... Tnx anyway 73 -ras-

Hi Hank:

I am having a problem getting into the repeater again, even though the signal is +20 coming into here. I left Stu a note, and thought I would mention it to you as well.

73, -cas-

HI HANK.
1. NEW TIP & LIP (WITH NEW PROTOCOL) - HAVE OPETIONAL
DISPLAY OF THE TO AND FROM CALL LETTERS (NICE TO HAVE IT
SOME TIMES AND NOT OTHERS.)
2. HIGH LEVEL 2 METER REPEATERS ARE HAVING A BAD TIME LATELY.
ONE OF THE MT. DIABLO MACHINES (145.41) IS NOW ONLY ON
FOR THE PACIFIC TRAFIC NET IN THE EVENINGS, BECAUSE OF JAMMERS.
WOULD YOU KNOW WHO I COULD GET IN TOUGH WICHCH WITH TO SEE
ABOUT PUTTING A PACKET REPEATER UP ON MT. DIABLO.?
(SELF-INTEREST, THEN I COULD HIT IT FROM STOCKTON)
73, JEFF
P.S. OUR KID IS DUE END OF AUGUST. HOW'S YOURS?

Hi Hank:
The gentleman that we spoke too, the one that want you to explain TIP & PIP (chuckle), his name was Andy (I missed his last), call = VE3FZK, and his address is: 504 Lakemead Way, Redwood City, Ca. 94062. I figured that it would be hard for you to write.

I asked about a 4.000 MHz Xtal, and the .cli man.. I will call if I have free time tomorrow and can come down.... 73, best... having a hard time tx/rx, but voice traffic on freq. is bad at this moment..... -cas-

Hank,

Here is a message I got from a fellow xeroxer back East. The discussion started when I (and some others) sent him your QST message describing the new protocol. Ron sent you his initial message. He is another where he gives some more of his ideas.

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Dave

P.S to Hank from Bill -- If you want to respond to Dave, just send me your respo and I will forward it him.

Hank I Just recieved this throush a DL thousht you misht
be interested.
01932 00024 US
Date: 15 July 1982 12:27 pm EDT (Thursday)
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In-Reply-to: Article-I.D.: houxc.225
To: HamRadio^.es
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If you want more info, my radio club in Buffalo has been thrashins out the header format and repeater/user interface formats for a while now.

Let me know if you set this, I think sometimes one of your machines disest these messases without my acknowledsement or yours.

Dave

Hank,

Please let me know when you return from your vacation so that I can can arranse to pick up my 8250. When my radio gets back from the shop I hope to be able to set the TNC up and running.

Thanks again for your help and I hope you a good vacation.

Steve, WB2GDQ

Hi Hank, John here...
Just saw your message about new versions of LIP/TIP and repeater.
Two brief reccommendations: first, a TIP feature which would have a bit table and/or a user settable timeout for packet transmission trisserinss. The command ^^(would begin the list of delimiters ; thereafter each typed character would have a bits turned on in the table of delimiters. ^^) would exit this mode. Thereeater whenever a character was keyed which had its bit on in this table, a packet would be sent. (This is the general case, user settable version of your KA6M** tests for colon, etc.) A third command such as ^^~ would clear the bit table . The timeout would be specified with a set of disits (followed by any nondisit) after a ^^t command (as in "^^t50 " to set the timeout to 50 tenths of a second). If any character has been keyed but no packet has been sent in that much time, the packet is sent on as-is. This is the perferred delimiter method for computer output since it tends to come out in bursts, but with no fixed delimiters. Setting the timeout to zero would disable it. Note that the keyed characters can only be edited locally before the packet is sent, so such editins is unreliable when the timeout is set. This is usually OK if the remote system also implements simple backspace (or delete) editins. I don't know if TIP accepts both to do the same thins; it should. It should also transmit them if they are keyed at the beginnins of a buffer (with no chars keyed) incase the previously sent text is now beins rubbed out. Probably the timeout set by the user is good enough to kick out these rubouts from the input buffer; they don't need to be expedited.

>The second thins to consider is that, on very brief readins, your new format for headers does NOT make forwardins via a repeater transparent, possibley losins the ability to forward thru multiple repeaters, since al (all) packets transmitted from repeater A to repeater B, no matter who they are ultimately for, must be sent with "A" and "B" in their fields. This takes up further space in, and requires, a hisher level protocol to deal with routins. I suppose it's a good first step, I just hate to think of chansins all those proms again later. Can you put a few RAM hooks into the system? That is, indirect subroutine calls thru a transfer vector in RAM which the ROM sets up at RESET and which can be patched to cause new thinss to occur, at those particular points in the processins that we thousht of BEFORE we burned the ROMs. The corollary is a patch facility, which I think can safely require a computer on the other end (use binary images instead of typins in hex or somethins, for ease of implementation). Two commands would be required, one (probably ^^ followed by some control character) which would besin a download from the terminal side, follwed by a 1-byte lensth, 2-byte address, and n-byte data, followed by normal text. The lensth is limited to 31 bytes so that if the user accidentally invokes this command, the lensth they supply would probably be invalid, if it was a space or alphabetic. The second command would enable (^^d for lack of a "TIP Reference card" to pick an unassisned letter) or disable (^^nd) downloadins of packets with patches in them. A particular packet "Protocol" field, say 1, would invoke the patch code. The information field of the packet would contain an address, data, and checksum (simple 8 bit sum) of the patch. Checksum prevents random packets which are not truly intended as patch packets from passins . The data is just moved directly from the packet buffer into the specified destination. Care must be taken to move only the exact number of bytes specified, so it can be used to make "delicate" patches of 1 or 2 bytes in transfer vectors. The default state of the TIP/LIP should permit downloadins; the repeater can be programmed at some point to periodically or on request transmit the current set of patches to implement the next level of protocol we desisn, and these can run out of RAM on systems with old proms.

The transfer vector entries I can think of are:
Packet Received from 8273 in good shape
Packet ready to transmit to 8273 (with buffer space available to move it around, if it needs expanding. This probably means "Not in the interrupt routine").
Unknown command from TIP input (^^x where x undefined).
I believe we can already patch interrupt vectors as they are in RAM, yes? If not, indirect each interrut routine thru a RAM location so it can be paxx patched.

This will give much flexibility in future development without redistribution of proms. And will also correct the few outstanding complaints about TIP and solve a DG performance bug while adding a general feature. Wish I could do these myself but time and lack of equipment presses me to hope that you can find them pretty easy to slide in.

It has just occurred to me that I can make the Ron Cain Small-C compiler available on my Unix system at Sun, to generate 8080 assembler input from C programs (which can probably be debugged under Unix C for ease). Small C lacks quite a number of features from C, but is a useful subset, is public domain, and is being continuously enhanced by the general public (see Dr. Dobbs' Journal, where new updates to it tend to be published.)
I have it online at MIT and can download it.
Then if a packet system becomes available to be put online to the Unix system (and can reach the repeater from Santa Clara), it can be put up as a second host on the net, and can be used to do development and subsequent downloading into VADCG boards or later TAPR boards.
The amazing professionalism of the TAPR effor amazes me; I hope they can keep up the time required to get their system totally out into the world.
I figured it would take much longer to get "turnkey" packet radio stations out into the world; it still will, because of radio interfacing and licensing requirements, but two major parts (hardware building and debugging and cpu-modem purchase and connection) have been eliminated, or hopefully soon will be. Maybe before another 2 years I can run a packet station.
(Tho actually at Sun I spend a lot of time around hardware people, and have learned a lot...maybe could debug another bare board now. But don't want to....have too much software that needs doing anyway. I can wait for the turnkey stuff.

Keep in touch..... John Gilmore. work phone 408-748-9900, usually there.

TO : Dan
FROM : Paul Rinaldo
SUBJECT: Legality of Packet Radio vs. Need for STA
REF : MSG of 2 July 82 from Dan Connors

After receiving your message and discussing it with you on the telephone I talked to Dave Sumner, K1ZZ, ARRL General Manager on Friday, 2 July. We agreed that the action would be turned over to Perry Williams, W1UED, ARRL Washington Area Coordinator on Tuesday, 6 July.

I spoke to Perry on Tuesday and asked him to get a quick reading on this because there are about two hundred packeteers wondering, at this point, whether they are operating outside the FCC Rules. He assured me that he would take it up when he was in Washington on Wednesday and Thursday. Also, he said that he had had discussions with the John Johnston, K3BE, Chief of the Rules Branch, Private Radio Bureau and had received assurances that packet tests contemplated by W1AW (actually [illegible] legal. I added that never in my discussions with the Chief, Private Radio Bureau and with the Chief Scientist did they indicate that our packet radio operations were outside the Rules. In fact, both PRB and OST get blow-by-blow descriptions of what we are doing by reading the monthly AMRAD Newsletter. It was clear to me that they thought they had authorized packet radio when the issued the Third Report and Order to Docket 20777 which authorized ASCII.

On Thursday afternoon, Perry called me to tell me that he had talked to the Rules Branch about this matter. They said that they believed that packet radio (HDLC, bit stuffing, etc.) was legal and that the individual (who happens to be a ham) at the Gettysburg Licensing Division was stating his own opinion based on his readings of the Rules. At this point, the FCC has some internal communicating to do, and it looks like the view that packet radio is legal (and no STA is needed) will prevail.

I plan to meet Perry at the FCC next week and expect to tell you final outcome then. Meanwhile, I suggest that you hold off preparing any STA request.

So as to put this to bed and prevent its recurrence, I urged Perry to get something in writing setting us of this particular hook. He said that the current arrangement, in cases of interpretation of the Rules, is to have Rick Palm, K1CE, draft an article for the "Washington Mailbox" column and get it blessed by John Johnston prior to publication in QST. This will go into an FCC notebook of interpretations.

To: All Interested Packeteers
From: Curtis, N6ECT
Date: July 9, 1982

For those of you who do not like to run up your phone bill, I [illegible] that is currently on the CommuniTree in San Francisco. The [illegible] deals with X.25 and might be of interest to the Packet community.

For Your Reading Pleasure 73, -cas-

To read, issue the command: TYPE X.25.DOC

To: All Interested Packeteers

From: Curtis, N6ECT

Date: July 5, 1982

Subject: Six Months Activity Report on KA6M** Packet Central

	CALLS LOGGED PACKET RADIO	CALLS LOGGED TELEPHONE	TOTAL
JAN	268	133	401
FEB	274	62	336
MAR	252	82	334
APR	109	88	197
MAY	174	131	305
JUN	110	89	199
MONTHS	1187	585	1772

The followins stations/individuals participated:

WA6JFZ, N6GJH, KD6LI, KA6NAN, WA6SLF, WA6RZW, N6FQR, N6BOH,
AD7I, KA2BOE, KO6R, KN6W, VE7CYD, WB6WBK, WB6YMH, W6FFC,

There were 90 QST messages sent by 20 stations/individuals.

*** ULYSSES S. ASCII 30-JUN-82
PARENT=*ASCII USAGE= 25

Full permission for reprinting or quoting items given by the Amateur Radio Research and Development Corporation c/o Paul Rinaldo, Editor, 1524 Springvale Ave., McLean, Va. 22101 & Ada Dee for "The Inventor". -cas-

According to most commentators, Ulysses Sandor Ascii was born in Rahway, New Jersey on February 2, 1903. His date of birth remains uncertain due to the unfortunate fact that two commentators, Hilda B. Ascii and Bruno Lollomalopalado are now deceased.

Miss Ascii continually claimed that she was the eminent Dr. Ascii's daughter, but no evidence has surfaced to legitimize her claim. Prof. Lollomalopalado is remembered by some as the foremost historian of Hawaiian culture in New Jersey.

Ulysses' parents were by all accounts immigrants from the Breaker on Yllivvin in Walse. With all their earthly belongings and four ham sandwiches, they boarded the ill-fated steamer H.M.S. Bempley some time in 1899 and travelled steerage to the Port of New York. Legend has it that an immigration official recorded the family name as "Ascii" as a truncated derivation of the actual name, recorded in the register of the St. Fidgeta's Church, Breaker on Yllivvin as "Askew". The father is recorded in the same place as Pellew D., named his son for Ulysses S. Grant and is believed to have maintained that Grant was President of the U.S. for most of his life. The senior Ascii deified Grant, and his picture is said to have hung next to that of the Tsar while the family still lived in Walse.

Pellew D. Ascii settled his young family in Rahway, attracted by its [illegible] and Old Dominion [illegible] he died minutes after Ulysses' birth. The cause of death was given as shock.

Ulysses reputedly left home at the age of eleven to study communications theory with Prof. Flanders Watthour, K.C., the leading psychic medium in the Rahway-Elizabeth community. Together, they outfitted an expedition and established the Secret Pellew Colony in Union City, N.J., in 1916. Some of their earliest communications experiments are still positively recalled in various taverns in Union City and Weehanken. The colony was forcibly disbanded by paramilitary vigilantes in 1920. Brought up on charges involving the allegedly obscene rites of the colony, Ulysses was returned to Rahway where he completed his education as a guest of the state. Prof. Flanders Watthour (q.v.) disappeared with most of the papers and written records of the colony.

A few fragments were recorded at high tide in Bayonne, N.J., quite by accident when an ESSO oil barge struck what appeared to be a cement buttress. Upon closer examination, it was found to be an earlier attempt to construct Grant's Tomb according to plans drawn by a relative of Cornelius Vanderbilt.

[illegible] signed by Emil Baudot. The box contained detailed drawings which, upon examination by the entire faculty of Columbia University in the Spring of 1951,

+++ SUBMESSAGES +++

*** U.S.A.1 30-JUN-82
PARENT=ULYSSES S. ASCII USAGE= 16

proved to be the incoherent crayon scribblings of a man named (fnu?) Murray (lnu?).

U. S. Ascii studied with Dr. Bruno Lollomaloealdo and the Rev. Alexander Babafray, fellows of Rahway state as well. Letters ascribed to Ascii's maternal uncle Pincas M. Basarab of Shamokin, Pa. tell little of his studies. Envelopes show that Ascii gave his return address as Penn. State instead of State Pen., probably to save the family's name.

After graduation from "Penn. State," Ascii's career demonstrated considerable misdirection. His only known novel, set in Secaucus, N.J. and titled, "Not a Pis Left Anywhere," was put into type by inmates at his alma mater and sold only three copies, all to his uncle Pincus.

Details of his life after this point became sketchy. We are able to surmise only after the experience as a failed author, Ascii moved to Baltimore where he took to the sauce. He was known for his preference in imported wines (Balihi mostly, Ripple when he could get it).

Ascii became increasingly despondent during this period and took to long stays around Baltimore wharves where he amused himself by gambling away the little money that was his. To pass the time of day, he spent odd hours in Engine Company No. 5 devising Fire Codes. His one-alarm, two alarm, etc. system caught on and was eventually recognized by the National Embers Society.

In 1933, he was one of the players in a historic game of liar's poker at Windy Paradise Cafe on Water Street involving two fellows named Ebb Cedick and Rene Wei Paquet, who claimed that he had a "code in the node." Using his own method of beating the system (the Chinese remainder theorem) Ulysses won a used Philco radio with only one knob missing. In reconstructing the damaged apparatus, he stumbled onto vital principles of electronics and mathematics. His career took a turn for the worse when a patent based on these ideas was turned down. Later students of Ascii discovered that the devices were the 1001 and 2002 processors, something that Intel wishes could be left out of history books.

He also invented a new optional seven or eight hole (or no-hole) code with unique assignments for everything he found on a discarded typewriter which was missing the fraction key. On the (free) advice of former patent attorney, he filed a trademark application, which was thrown out by the patent office as a frivolous application without merit. The same code was later submitted as someone else's work and eventually adopted by the ANSI X3 committee. Ulysses finally achieved recognition in 1968 when the X3.4 Task Group voted to name their code "ASCII," but not without many grueling night sessions to expand the 'acronym' to American Standard Code for Information Interchange. Ascii finally achieved parity by having his name on his original invention.

Back to the early days of Baltimore. Falling again into despondency, he threw his lot in with the mystical, migrant, bandit gypsy, Tungar Gesohnetten.

*** U.S.A.2 30-JUN-82
PARENT=U.S.A.1 USAGE= 14

As a member of his band, he lived in the Jersey Pine Barrens, living off the land and robbing travelers until routed by an expedition of state [illegible] by Lt. Unger Throughput.

Convicted and sentenced again to Rahway, he became a tenured professor and is known to have taught classes in Meat Science, Greek Athletics and Electronics. Some accounts have it that he married a [illegible] employee, Kay Nada, but no proof of this bond has thus far surfaced. Ulysses Ascii collapsed and died at Rahway on November 4, 1969. Medical examiners recorded that he choked on a prune pit but that foul [illegible]

HAVE A HAPPY 4TH.....

SENT: 27 JUN 82 07:53:55
READ: 01 JUL 82 22:54:

to: all groups
from: TAPR

After several hours of transmission of test packets, Lyle Johnson WA7GXD successfully initiated the first amateur packet radio contact with all-American hardware and software, using the Tucson Amateur Packet Radio Corporation Terminal Node Controller (TNC), at 9:12PM MST, June 25th, 1982. At the receiving end was Den Connors, KD2S, who was co-located with Lyle at the WA7GXD station.

The two-way contact lasted for about one hour, during which time several different experiments were conducted to determine optimal selection of components for the TNC modem amplifier/filter set.

Within twelve hours of first QSO, the experiment was [illegible] over a distance of about twenty miles, from one side of Tucson [illegible] the other, over conditions which were as bad as "less than S1", with [illegible] first packet "ras-chew" lasted about 45 minutes, with different antenna and signal-level combinations attempted by Lyle and Den.

Also at the first transmissions were Marc Chamberlin WA7PXW, the TAPR Software Chairman, Margaret Morrison KC7MA, the TAPR Publicity Chairman, and Heather Johnson N7DZU, a member of the Publicity Committee.

These tests culminate hundreds of hours of effort on WA7GXD's part, who has spearheaded the design of the TNC as Hardware Chairman. Completion of modifications to the on-board modem next [illegible] allow Lyle to release a final version of the TNC to a [illegible] Design firm for the artwork and construction of TAPR [illegible] boards, which are slated for a July release.

In parallel with the hardware efforts are those of WA7PXW, who has been using a Point Four minicomputer as the development system for TAPR TNC software. Marc has completed the simulation of interfaces between the TNC and an attached terminal, as well as between the device and the radio link. [illegible] operations have all been sucessfully simulated.

The FORTH software will be loaded into an Apple microcomputer for final debussing, and then loaded into an AIM65 micro for PROM-burning. Expected arrival of TAPR Beta systems into the first ten U.S. and Canadian cities for phase one of beta test is due in five to eleven weeks.

KD2S, President
Tucson Amateur Packet Radio Corporation

Date: July 1, 1982

Subject: Calls Logged on KA6M Packet Central
June 1982

N6ECT	43
W6JHJ	22
WB2GDQ	17
K6VCO	16
W6OCP	16
N6FQR	15
KA6ETJ	12
KD6LI	11
N6GJH	10
W6RAW	10
WA6JFZ	09
[illegible]	08
WA6SLF	04
KA6NAN	04
WA6RZW	02
WB6SDE	02
N6FTZ	01
KA9Q	01

Have a happy 4th....

Hi Hank. It would be nice if you were to increase the size of the packet somewhat, if only to compensate for the additional overhead. My reason is somewhat selfish, but I'm sure that it would be important to other CP/M people: CP/M uses 128 byte records. When sending .COM files, it would be nice to be able to receive a record at a time, simplifying programming and allowing some of the hookups (like mine) to work without too much crap. Can the TNC handle it? How about just jacking it up to 256 bytes instead of 128, just to keep it power of two and allow for any new stuff we may do later, especially with weird routing codes or whatever. Anyway, just a thought. If you set this before you leave on your vacation, how about dropping a note re next packet meeting?

Talk to you later, Rick

[illegible] does it have RAM or ROM, does [illegible] particular field address, or [illegible]

Or is it just another PROTOCOL?

[illegible] very [illegible] to Nick, Sarge [illegible] 73, best for [illegible]

Date: 25 June 82
To: All Packeteers
From: Hank Magnuski

I am about 95% throush testing new versions of the LIP/TIP and KA6M/R software which does away with hardwired ID codes. The strategy is an expansion of the AMRAD suggestion to put the callsign at the front of each packet. Each packet will have a header of the following form:

FLAG ADDR CTL FMCALL TOCALL ID0 ID1 Infofield FCS FLAG

ADDR Assigned always to some fixed value. I'm using FE.
CTL All current values unchanged plus the addition of
Repeater connection reject packet
Broadcast packet
FMCALL 7 bytes of callsign of the orisinator
TOCALL 7 bytes of callsign of the desination
ID0, ID1 Two bytes to indicate the protocol being used at the next higher level, level 3.
Info Usual information field

The rules for operation are very simple:

A link-level packet going from A to B will have CALLA and CALLB in the header, with no exceptions. This applies to the repeat[illegible] well, which keeps a table of how to redirect [illegible]
All packets transmitted by the repeater have its [illegible] FMCALL field.

I will have more details later, [illegible] I feel that this format solves most of the problems which have been aired recently, and solves problems which are currently restricting our growth. I'm open to midcourse corrections, but they better come before we set all our EPROMs [illegible] The strategy allows multiple repeaters on the same frequency in [illegible] domain, it allows direct point-to-point contacts, and allows AMSAT to use PHASE IIIB without any person coordinating the addressing [illegible] I will put LIPM04.ASM and TIPM04.ASM on thi[illegible] medium when I feel they are adequately tested.

See you when I get back from my vacation (July 12th).

TO: HM
FROM: DC
SENT: 21 JUN 82 09:40:58
READ: 21 JUN 82 16:54:48

Hank,

Thanks for your support of efforts here. I think you can understand the type of effort involved in keeping three projects going simultaneously for our first TNC, as well as the AMSAT projects, protocol investigations and just keeping people informed. I have difficulty just keeping things going here, so I have been most careless in keeping outside help coordinated. I am sorry.

You and I are going to be working together on several projects in the near future, and I look forward to these protocol and AMSAT-related discussions, but there are several things that are becoming apparent which TAPR could really use collaboration with. Your original offer to debug Lyle's VADCG TNC was delayed by his hard push towards our own system, but he is now quite willing to send the board to you for assistance. Mike Parker, now KT7D, will be consulting again in S.F. next week, and will act as courier if you are willing. He'll also drop off the latest set of documentation and "P.R." produced by Margaret Morrison, KC7MA (whose call is also subject to change in the near future). I'll send copies for each of your beta participants, and as many more as you think you would like, either before or after you get this first set.

The beta test is now being constrained to just 75 boards, so that we will only be using 12 of our initial 16 cities currently slated for the full program. S.F. will obviously be one of the three most important test cities, and clearly number one in terms of "experienced" amateurs. I would like to work directly with you , however, in pre-release reviewing of the TAPR systems reference manual. In a manner which I've yet to imagine, the beta boards will come with a manual which looks to be in the 200-page class, along with full cabling, completed and tested board and everything else required except a pretty box, for under $700. We have added more PROM (that nasty VADCG software took space!) and put a little more care into the P.C. layout (CAD-layout/drilling/mfg)... It should be quite impressive.

With respect to protocols, ARPA has given me complete documentation, but I'm still waiting for tapes and more docs from the NBS. I think the best format to send to you will be CPM disks, using a sequence here of tape-to-VAX-to-Cyber-to-DEC10-to-CPM floppy(It's a circuitous route, but I'm told that I'm getting $350K this fiscal year to come up with a better idea for "more direct" networking of our micros and mainframes!). We should discuss our prejudices on these levels after we get familiar with them. Would you like to be my guest in Tucson this winter?

The ARRL committee will be another common point for us, and I'm just waiting to see what Paul would like us to do first before I put my foot in my mouth...

Lastly, the AMICON/IIIB projects are approaching (slowly). I am spending a lot of time on the modulation problem, and will report on some things in my article in the August QEX. I'll leave a copy of same on this net for your review before I release it to Paul. It sure looks like the best way today would be QPSK w/ Viterbi decoding, if the gear is made available.. Else Diff-BPSK, with easily-fabricated PSK/MSK modulators, with an eye to MSK coherent demodulators in future revisions .

Can you get me path parameters for AMICON? Mike has an excellent path

calculation program for his Apple, but we need more specific estimate of the appropriate noise figures, assumed environments, etc. to set a better handle of trade-offs.

I look forward to spending more time with you as our time-constraints clear a little, if only via the printed word... Direct digital connections will come in time..

73, Gen

To: All Interested Packeteers
From: Curtis, N6ECT, PPRS@SFO
Date: June 19, 1982

Subject: R.A.T.S. N.E.S.T. System 2

Just in case that you are into telephone BBS callins, and want to save some time and money, I have entered below the logon format for WB2CAM, Gordon's BBS in New Jersey at (201)-785-3565.

[illegible] [CR] REPEATEDLY UNTIL BAUD IS ACKNOWLEDGED
(XXXX) baud entry ;where (XXXX) = 300/1200

[illegible]nter last name or ID number-
Enter first name
Checkins user log, please stand by...

Where are you callins from -
What is your phone number -

Is this correct (Y/N) ?
Addins you to user log, please stand by...

Updatins Activity log, please stand by...

Welcome to R.A.T.S. N.E.S.T. System 2
Located in Little Falls, N.J.
Operated by Gordon WB2CAM

This system is dedicated to the dissemination of information pertainins to Amateur Packet Radio. Other topics such as computers, telephone systems, and related subjects are also welcome. If you have trouble usins the system, type 'HELP' after the 'COMMAND --->' prompt. If you wish to have an ID for the system (It is required to 'Receive Mail' but not to 'Send' it.) or have a question, type 'Send' and the system will prompt you for the rest. Note: if the messase is to be private it must be directed to a person with an ID and requires the execution of the 'Mail' command before the 'Send' command. Good luck and thank you for your interest.

SYSTEMS: (MAIL) (BULL)etin board (DISC)ussion

COMMANDS: DIR ECHO (ERA)se
(RE)ceive (SE)nd (SYS)tem
HELP (ED)it LOGON
(TER)minate TIME (PHO)ne #'s

To select a system, type it's name.
You may abbreviate commands to the letters shown in parenthesis.
(It is no lonser neccesary to place the system name along with the command, although that mode is still supported.

The system has a new and more concise COMMAND prompt.
It is a '->' and will replace 'COMMAND --->'
Thanks, Gordon WB2CAM

Type a '?' for a menu of commands.

The rest is fairly simple; for example, to read the bulletins, [illegible] the prompt type:

- BULL <-
SYSTEM = BULL (will appear)

- RE <- (to read the bulletins /also/ the [illegible] a system prompt, and not to be typed)
Press P to pause, press A to abort. (will appear)

(M)ultiple (N)umeric (T)o (F)rom (S)ubject - (will appear; I entered 'M'
Starting number? (will appear; I entered '1'
and the system will begin to dump the bulletins.

I hope the above information will be [illegible] and save [illegible] some time.
73, N6ECT, Curtis

TO: [illegible]
FROM: F[illegible]R
SENT: 18 JUN 82 15:46:25
READ: 19 JUN 82 00:36:[illegible]

To : All
Subj: AMTOR

For your information, the text of the ARRL's Petition for Rulemaking to the FCC to permit AMTOR (CCIR Rec. 476-2) in the Amateur Radio Service is quoted below.

73, Paul, W4RI

Before the
Federal Communications Commission
Washington, D.C. 20054

In the Matter of	)
Amendment of Part 97.69 of the Commission's Rules Regarding Radioteleprinter Codes Authorized in the Amateur Radio Service.	)

PETITION FOR RULEMAKING

The American Radio Relay League (the League), the national non-profit organization of Amateur Radio Operators in the United States, hereby respectfully requests that the Commission amend [illegible] 97.69 of its Rules to permit transmission by amateurs of [illegible]ital teleprinter code specified in Recommendation No. 476-[illegible]B) of the International Radio Consultative Committee (CCIR), known in the Amateur Radio Service as "AMTOR," in the amateur high-frequency bands. In support of its request, the League 1/ states as follows:

AMTOR

1. AMTOR is an automatic request-repeat radioteleprinter system which conforms to the standards of CCIR Recommendation 476-2. 2/ That standard was developed for the commercial [illegible]ime service, and has come to be known commercially under the trade name Sitor. To avoid confusion, AMTOR was coined as a term [illegible] describe amateur use of the method. Basically, a [illegible]adioteletype station utilizing AMTOR transmits data in blocks of three characters, pausing after each to obtain from the receiving station either an acknowledgement or instructions to re-send. Microprocessor circuitry is generally used to automate the process. Because data transmission and acknowledgement alternate in a time-sharing manner, duplex frequency utilization is unnecessary. Both receiver and transmitter operate on the same radio frequency.

2. Perhaps AMTOR's greatest benefit is, by definition, reliable, error-free copy at the receiving teleprinter, and the certainty of the sending operator that the data has been received correctly. The automatic "hand-shaking" technique of AMTOR transmissions allows reliable communication even under marginal and fading high-frequency propagation conditions. Conventional

Baudot (International Telegraphic Alphabet No. 2) and ASCII (American Standard Code for Information Interchange) operators often must, under marginal propagation conditions, manually engage in time-consuming requests for repetion of portions of transmissions. Data is blindly repeated, or lost. With AMTOR, the equipment merely slows down during signal fades and resumes normal speed during periods of signal consistency. For this same reason, extended communications range is possible without error.

3. In the Amateur Radio Service, stations are required by Section 97.67(b) of the Commission's Rules to use the minimum amount of transmitter power necessary to carry out the desired communications. Use of AMTOR uniquely allows reduction of transmitter power to very low levels, because the effects of power reductions on sending speed are immediately obvious to the transmitter operator. Thus, use of low power and reduced interference potential are normal by-products of AMTOR operation. It will also be easy for third parties to ascertain whether a particular frequency is occupied by stations using AMTOR, as both the sending and receiving stations are continuously transmitting at a .45 second rate) with an audible "chirping" sound. rtent interference resulting from a third station being to hear one station due to skip conditions is precluded.

AMTOR Operating and Technical Characteristics

4. As mentioned above, the AMTOR error-correcting technique maintains error-free copy over a very wide range of received signal strengths. When signals are low, the AMTOR station simply re-transmits the same data until it is received correctly. Thus, the relevant factor in AMTOR transmissions is the sending speed. Because the sending operator has constant and immediate knowledge of the rate of message transfer without being so informed by the receiving station, signal strength per se is irrelevant.

5. As defined by CCIR Recommendation No. 476-2, AMTOR uses a 100 baud transmission rate. This is slightly higher than the 100 WPM (75 baud) Baudot speed, but less than the maximum 300 baud rate authorized for ASCII by present Section 97.69(b)(2) of the Rules. The FSK shift specified in CCIR Recommendation 476-2 is 170 Hz, the "narrow shift" commonly used for high-frequency radioteletype operation. Of course, other shifts are possible, requiring only adjustment to the FSK generator and RTTY demodulator being required. CCIR Recommendation 476-2 indicates an exact one-to-one relationship between ITA Alphabet No. 2 (standard "Baudot keyboard") and AMTOR characters. There is no built-in encryption feature, although commercial equipment manufacturers note the possibility of transmitting previously encrypted data over a CCIR Recommendation 476-2 link.

Amendment of Section 97.69 to Permit Use of AMTOR is in the Public Interest

6. It is incumbent on the Commission, pursuant to Section 303(g) of the Communications Act of 1934, to "study new uses for radio, provide for experimental uses of frequencies and generally encourage the larger and more effective use of radio in the public interest." Perhaps the best medium for study of such new uses and experimental techniques is the Amateur Radio Service, due to its large number of innovative, technically oriented

members. Thus, responsive to the above mandate of the Communications Act, the Commission has recognized as a basis and purpose of the amateur's proven ability to contribute to the advancement of the radio art." 4/ In the Radio Regulations promulgated by the International Telecommunication Union, the Amateur Service is defined 5/ as "A service of self-training, intercommunication and technical investigations carried on by amateurs, that is, by duly authorized persons interested in radio technique solely with a personal aim and without pecuniary

7. On January 30, 1980, the Commission adopted a Third Report and Order in Docket 20777, 7/ providing for and establishing rules governing the use of ASCII, 7/ providing for and establishing rules governing the use of ASCII, thus amending Section 97.69 of its Rules. Therein, at paragraphs 5 and 7, it

> 5. In other comments, amateur operators expressed interest in using radioteleprinter codes other than Baudot or ASCII. Frequently cited examples were the Binary Coded Decimal (BCD), Extended Binary Coded Decimal Interchange Code (EBCDIC), Moore and Correspondence (IBM Selectric codes). It was also felt that the Commission should allow the use of various "computer" or "machine" languages for computer-to-computer communication; and that the rules should provide for experimentation in the use of "packet switching" techniques.
>
> * * * * * * * * *
>
> 7. Our intent in this proceeding was simply to expand the operating capabilities available to amateur radioteleprinter operators by providing for the use of ASCII. We find, however, that the comments generally go beyond our proposal and seek more or less total de[illegible] in the area of radioteleprinter operation. We are not necessarily opposed to such extensive deregulati[illegible] agree that it would be in perfect harmony with the basis and purpose of the Amateur Radio Service as articulated in Section 97.1 of the Rules....

8. The deregulatory action proposed herein would be a further step toward removing unnecessary regulatory burdens on amateur experimentation which presently inhibit fulfillment of [illegible] The Commission charted the deregulatory course advocated herein in Docket 20777, and has continued to the same in Docket 81-699, with respect to permitted teleprinter codes. The instant request would also grant to amateurs a tool of potentially vital importance in emergency communications. The savings in time and increase in accuracy in transmission of message traffic during emergencies allowed by the error-correcting characteristics of AMTOR operation make the public benefit of the instant request [illegible]

Technical Specifications as Contained in CCIR Recommendation 476-2 Should be Adopted to Facilitate Monitoring

9. The Commission has recently proposed 8/ in PR Docket 81-

699 the amendment of Section 97.69 of the Rules to permit the use of any digital encoding technique in the amateur frequency bands above 50 MHz. That proposal, if adopted, would permit the use of AMTOR on frequencies above 50 MHz. The instant proposal, therefore, proposes the use of AMTOR only on amateur high-frequency bands where Baudot and ASCII emissions are permitted. 9/

10. When the Commission authorized the use of ASCII in 1980 10/ it stated that:

> Past experience with the use of Baudot Code in the Amateur Radio Service indicates that the vast majority of operators use common radioteleprinter standards, thus simplifying enforcement monitoring both by amateurs and our monitoring personnel. Thus, we are not adopting any further standards [other than maximum [illegible]].

Beyond specifying in detail the transmission code to be used, CCIR Recommendation 476-2 sets forth precise specifications for transmission speed (100 baud), carrier shift (170 Hz) and block timing (0.45 second). Successful AMTOR operation depends upon nominal crystal stability of the transmission rate and block timing at both sending and receiving stations. An obvious question is presented as to whether these standards should be adopted as rules or whether, as in Docket 20777 pertaining to ASCII, only a maximum sending speed applicable to each band need [illegible] monitoring difficulties by amateurs and Commission enforcement personnel, and to assure full compliance with Article 41 of the International Radio Resulations, 11/ it is proposed that the standard transmission speed and block timing be adopted exactly as specified in CCIR Recommendation 476-2 in the proposed amended Rule Section 97.69. The transmitter frequency shift may be simply limited to "less than 900 Hz," as is presently required in Section 97.69(a)(3) for Baudot transmissions. The attached Appendix sets forth the proposed rule amendments.

Conclusion

11. The proposed rule change will continue the Commission's deresulatory effort in the area of Amateur Radio digital electronic experimentation, thus facilitating accomplishment of the amateur's duty to contribute to the advancement of the radio art. Since 1978, amateurs in the United Kingdom and elsewhere 12/ have experimented with AMTOR as a means of securing error-free teleprinter operation in the high-frequency bands. To date, some 40 amateurs are active with AMTOR. The Amateur Radio resulations of Australia, the United Kingdom and West Germany now permit its operation. Several U.S. amateurs 13/ have under Special Temporary Authority conducted experiments with AMTOR. It is the League's understanding that such authority has been renewed, and that preliminary reports filed by those experimenters are on file with the Commission. The concensus of those operators is that AMTOR does indeed provide nearly error-free transmission even with fading or otherwise marginal propagation conditions.

Wherefore, the premises considered, the American Radio Relay League, Incorporated respectfully requests that the Commission

issue a Notice of Proposed Rule Making at any early date, proposing amendment of Section 97.69 of its rules to permit the use of the digital code specified in Recommendation 476-2 (1978) of the International Radio Consultative Committee, known in the Amateur Radio Service as AMTOR, in the amateur high-frequency bands.

Respectfully submitted,

The American Radio Relay League, Incorporated

By Christopher D. Imlay
Its Counsel

225 Main Street
Newington, CT 06111

May 26, 1982

1/ The League gratefully acknowledges the extensive and helpful assistance of Mr. Bill Meyn, K4PA, in the preparation of this [illegible].

2/ Attached hereto as Exhibit A.

3/ 20 Millisecond changeover time is typical.

4/ See Section 97.1(b) of the Commission's Rules.

5/ Article I, Section II.

[illegible]lar definition appears in Section 97.3(a) of the [illegible]

7/ FCC 80-35, 45 Fed. Reg. 8990.

Notice of Proposed Rule Making, FCC 81-459, 46 Fed. Reg. 50993 et seq., released October 9, 1981.

9/ See attached Appendix, Exhibit C.

10/ See Third Report and Order, Docket 20777, 45 Fed. Reg. 8990.

11/ Article 41, Section 2, Paragraph (1) requires, inter [illegible] amateur transmissions be made in "plain language". It is presently unclear how this requirement may be interpreted with respect to digital radioteleprinter codes in general.

12/ See Exhibit C, an article from the June, 1981 QST article discussing AMTOR.

EXHIBIT A. (Copy of CCIR 476-2, from document entitled "Recommendations and Reports of the CCIR, 1978, XIVth Plenary Assembly, Kyoto, 1978, Volume VII, Mobile Services, Geneva, 1978, ISBN 92-61-00731-7,, under Direct-Printing Telegraph Equipment in the Maritive Mobile Service, (Question 5-2/8)).

EXHIBIT B. (As follows):

PROPOSED AMENDMENT TO PART 97 OF FCC RULES

Section 97.69 Digital Transmissions.

Subject to the special conditions contained in paragraphic (a), (b) and (c) below, the use of International Telegraphic Alphabet No. 2 (also known as the Baudot Code), the American Standard Code for Information Interchange (ASCII) and International Radio Consultative Committee Recommendation 476-2 (1978) (also known as Amtor) may be used for such purposes as (but not restricted to) radio teleprinter communications, control of amateur radio stations, models or other objects, transfer of computer programs or direct computer-to-computer communications, and communicating in various types of data networks (including so-called "packet switching" systems); provided that such operation is carried out in accordance with the other regulations set forth in this Part.

(a) NO CHANGE

(b) NO CHANGE

(c) Use of International Radio Consultative Committee Recommendation 476-2 (Amtor) is subject to the following requirements:

(1) The code, baud rate and emission timing shall conform to the specifications of CCIR 476-2 (1978) Mode A or Mode B.

(2) A1 and F1 emission shall be utilized on those frequencies between 3.5 and 21.25 MHz where their use is permissible.

(3) F1, F2 and A2 emissions may be utilized on those frequencies above 28 MHz where their use is permissible.

(4 When frequency shift keying (type F1 emission) is utilized the deviation in frequency from the mark signal to the space signal, or from the space signal to the mark signal, shall be less than 900 Hz.

TO: HM
FROM: PLR
SENT: 17 JUN 82 12:54:22
RCVD: 17 JUN 82 17:18:27

To : All Packeteers
Subj: Call for Articles on Digital Modulation Techniques

At the AFCEA Amateur Radio luncheon on June 16, I had the chance to talk with Jan King, W3GEY. He asked whether QEX would be a good place to publish technical articles on digital modulation techniques such as QPSK and MSK. I recalled that Sam Connors, KD2S and Steve Robinson, W2FPY had mentioned that they had some good written material as well as the possibility of generating an article. (Also, I just received via this channel a message from Den offering an article for QEX on "Modulation and Coding Techniques for Amateur Packet Radio," which I'm happy to accept.)

All I can say is that articles on QPSK and MSK would be particularly welcome at this time. Certainly, they are candidates for both terrestrial and satellite packet operations. Also, I sense a lack of knowledge on these modes by hams with a good appreciation of FSK and AFSK.

Both the AMRAD Newsletter and QEX can be conduits for articles such as these. The AMRAD NL is read by many packeteers in the U.S. and Canada. QEX has a larger circulation to experimenters in general and some packeteers. Both have some size constraints for economic reasons. But of the two, QEX is better able to handle more of the longer articles (e.g., four printed pages).

So that we can start "singing out of the same hymnal" on this subject, I include, below, some technical papers which you may wish to look up if you haven't already run across them:

Mathwich, Balcewicz and Hecht, "The Effect of Tandem Band-Limiting on the Ko/Mo Performance of Minimum (Frequency) Shift Keying (MSK)," IEEE Trans. on Comms., Vol. Com-22, No. 10, October 1974.

Gronemeyer and McBride, "MSK and Offset QPSK Modulation," IEEE Trans. on Comms., Vol. Com-24, No. 8, August 1976.

Murota and Hirade, "GMSK Modulation for Digital Mobile Radiotelephony," IEEE Trans. on Comms., Vol. Com-29, No. 7, July 1981.

Simon, "A Generalization of Minimum-Shift-Keying (MSK)-Type Signaling Based Upon Input Data Symbol Pulse Shaping," IEEE Trans. on Comms., Vol. Com-24, No. 8, August 1976.

More good refs and/or an organized bibliography would be welcomed.

73, Paul, W4RI

Welcome Back Hank:

I hope that you trip was a good one, and that your jet-lag is not so bad (chuckle). Well, with everyone (TAPR/NJ/etc.) moving ahead, what can we do to """blow some minds""" in the world of packet radio??? This subject always makes me feel that I should have specialized in electronic & computer sciences rather than in psychology and art, as I would like to be able to do more to advance the state of packet radio, right now, than anything else!

Would it be polite to put some people on the spot about their intentions within the development structure of packet radio; i.e. Daylight/RTTY link/ Corp. Papers/new software/etc. Or would this make people feel uncomfortable? Do we need a new steering committee or revitalize the old one? Should we ask personally what has happened to the activity and projections made by packeteers in the past? Or --- should we just sit around, and wait? I am not being negative, I am still trying to understand. Is there anything that I could be doing, limited as I am? I know that you are probably tired of hearing this stuff, and perhaps sometimes wonder why you ever got into this form of communication; but I think that you like it as much as me, so therefore, "push on"!

Enough ramblings for this morning, welcome back, get some rest, and maybe we will see you on the net. Only one other thing comes to mind; and that is: Did I make the TAPR BETA test list?

73, best -cas-

TO: HM
FROM: PLR
SENT: 13 JUN 82 14:29:53
READ: 14 JUN 82 01:30:19

To : All
From: AMRAD

On May 31, 1982, Dave Borden, K8MMO and I made a successful [illegible] 1200-baud packet QSO on 10 meters. We were both using VADCG TNC boards, Bell 202-compatible modems, and ICOM IC-701 HF transceivers in the ssb mode. It was no great DX working between Sterling and McLean, VA, but we learned a few things.

Dave and I are just far enough away (with a couple of mountain ridges in between) that direct 2-meter FM communications has not been possible the times that we have tried it. Normally, we communicate using packets via the 148.81/21 repeater which is sometimes noisy due to two causes: (1) Dave's not-full-quieting signal into the repeater, and (2) some repeater-transmitter-generated impuslive noise. So, on two meters, via the repeater, we usually have good packet communications but with numerous retries from time to time due to the impulsive noise. Also, we have learned that keeping the packets short (half a line or so) will usually minimize the number of necessary retries.

The 10-meter QSO, which lasted over 2 hours, wasn't like that. Even though there was quite a bit of background noise on both our signals, we were able to get most packets without retries. That's true for long packets as well. Some two-line packets made it on the first try.

We found that receiver tuning was a bit critical. The main problem is that neither of us had any tuning indicators on the modems. So, we used our ears and kept tuning the RIT control until it popped in. Stability was good enough that we were able to stay connected without retuning for around 45 minutes at a time before drift made it necessary to correct the RIT.

Some of the transmissions sounded lousy, like the proverbial rain-barrel effect, indicating some amount of multipath. The packets frankly [illegible] Signals were fairly always in skew with only slow, flat fading at at times.

Plans are to try some 2-meter F1 tests (actually F2J) using 2-meter transceivers in the ssb mode.

If anyone who is capable of putting a 10m signal into the Washington, DC area would like to QSO on this mode, please give me a jingle. Because I'm self-employed and can usually set my own schedule, I can handle a sked almost any time. The best number to reach me, days/eves/weekends, is 703-734-0878.

Will try to keep you informed.

73, Paul, W4RI

TO: HM
FROM: DC
SENT: 04 JUN 82 20:35:26
READ: 14 JUN 82 01:27:06

To: All groups
From: Tucson Amateur Packet Radio

On June 2nd, 1982, incorporation papers were filed to create the Tucson Amateur Packet Radio Corporation, licensed in the state of Arizona as a non-profit scientific corporation. The stated purposes of the corporation are:

" scientific testing and research into the development and improvement of communication systems for use in the Amateur Radio Service, including but not limited to digital packet radio communications; the research and testing of systems, hardware and software for packet radio local area networks and computer network systems; and disseminating to the public information obtained as a product of such research and testing..."

The TAPR Corporation was formed to serve as a liason between standards organizations, profit and non-profit corporations and the amateur radio groups interested in this new technology.

Den Connors, President TAPR

TO: HM
FROM: DC
SENT: 04 JUN 82 20:33:10
READ: 14 JUN 82 01:28:35

To: all groups
From: Tucson Amateur Packet Radio

The TAPR Microwave Committee, headed by Dr. Mike Parker, KC7GD, has settled on a design strategy for the AMSAT phase III L-band linear amplifier development effort in Tucson. An Arizona-based corporation is donating to TAPR the required transistors to create an all solid-state amplifier in the 20-40 W class, using L-band pulsed-power transistors.

Following receipt of the devices and ancillary components, an initial set of prototypes will be built and tested with equipment recently acquired for TAPR by Mike. The schematic, board layout and design/implementation notes will be released when available.

Den Connors, president TAPR

To: All groups
From: Tucson Amateur Packet Radio

Initial negotiations were completed on May 28th between TAPR and the NBS, setting up a cooperative test program of NBS higher-level protocols using the soon-to-be-emplaced TAPR Beta test sites.

The NBS is sending TAPR complete listings, documentation and programs on magnetic tape, for implementing the current (prototype) offerings of Internet and higher-level software algorithms. Updates will be sent automatically as required.

TAPR will be looking for voluntary support from Beta test sites during the later phase of testing, if the different protocols prove useful for amateur packet radio. We will be using a conventional X.25 packet network for communicating with the standards labs at the Institute for Computer Sciences and Technology.

Dan Connors, President TAPR

To: all groups
From: TAPR

Any groups requiring beta boards from TAPR for the beta testing stages this summer should advise us not later then next Friday, as we have decided to keep the actual tests limited to 75 participants, or approximately 3 testers per site. Just leave a message on the PRNET telling me call [illegible] name.

Our official release date for beta is six to twelve weeks, with seven weeks the most likely time for boards that will speak VADCG and TAPR protocols (concurrently). Transformers, connecters and cables have been added to the release, allowing us to sent out completely assembled and tested units to beta test sites (that's the only way these 75 boards will go out this time). The price will still be under $200 for the whole system (they're being released to testers at cost)..

73 Dan

TO: HM
FROM: DC
SENT: 10 JUN 82 23:38:48
READ: 14 JUN 82 01:29:38

To: All groups
From: TAPR

Our July newsletter follows below. Feel free to distribute the information to all.

73, Den

Hello from a very excited bunch of hams in Southern Arizona! We have expanded our numbers very rapidly in the last month, are dangerously close to finishing our alpha hardware testing and the initial interface and protocol software, and have heard first test packets from our boards. We were involved in the ARRL SW Convention during the first weekend in June, with great success, and we have been "pushing packets" through a new public relations staff. We have also formed a non-profit scientific corporation to handle relations with a number of corporations, university groups and government agencies, in an effort to expand the size and breadth of the amateur packet radio effort.

On June 2, 1982, the Tucson Amateur Packet Radio Corporation was licensed in the state of Arizona as a non-profit scientific corporation. The stated purposes of the corporation are: "...scientific testing and research into the development and improvement of communication systems for use in the Amateur Radio Service, including but not limited to digital packet radio communications; the research and testing of systems, hardware and software for packet radio local area networks and computer network systems; and disseminating to the public information obtained as a product of such research and testing...". The TAPR Corporation was formed to serve as a liaison between standards organizations, profit and non-profit corporations and the amateur radio groups interested in this new technology.

TAPR and AMRAD will be forming formal affiliation later this month, and will be working together closely on very common grounds.

TAPR Hardware Report de Lyle Johnson, WA7GXD

The Southwestern Division ARRL Convention in San Diego was a smashing success from the Packet Radio standpoint. Alpha TNCs were connected via hardwire link, and two terminals were connected up so folks could send packets back and forth. ARRL President Vic Clark, W4KFC, visited the TAPR booth and was given a brief demonstration of this exciting new mode. The Saturday A.M. forum was so suc-

cessful that TAPR ran an unscheduled "Introduction to Packet Radio" presentation that afternoon. The hall was packed, with the overflow lining the walls. Eventually, the doors were opened and people were crowding in the hallway, straining to catch every word. Many an ASCII/RTTY buff appeared ready to convert, with plenty of active audience participation. An unqualified success.

Alpha boards are currently running some diagnostic software that reports on CRC status, etc., for hardware/modem debugging. This software allows direct interface to the TAPR/FORTH kernel for hardware interaction. The net effect is to greatly accelerate hardware debugging and patching.

Alpha boards appear to be about 95% functional as of this writing (10 June 1982). The weekly TAPR net of 9 June 82 witnessed the first TAPR packet transmission when WA7GXD surprised everyone with a couple of test messages. The real "acid test" of exchanged packets via radio link is anticiated for the weekend of 12-13 June 1982, barring any unforseen interference from Jobs and other such meddling.

The Beta Test of the TAPR TNC is planned to start sometime in July. While Alpha Test is primarily hardware-related, with software/protocol feasibility testing thrown in, Beta Test is primarily software/protocol oriented, with interfacing the primary hardware goal.

The Hardware group will be supporting the Beta Software testing by providing an EPROM-programming adapter for the TAPR TNC. This adapter connects to the parallel user port, and will enable the Beta Test site to program the 2732 EPROMs used in the TNC. It is expected that each Beta Test Coordinator will obtain one of these adapters for his particular Site and do the programming for his group. This will enhance the flow of software update information and free the Tucson group from excessive correspondence in this regard.

The Beta-specific Hardware goals are to interface the TAPR TNC to as many radios and computers/terminals as possible. Each Beta Site will provide a list of radios that are accessible to that Site for Beta test, and it is hoped that all radios in the Site will be interfaced. To avoid duplication of efforts, and to enhance productivity within the Sites, TAPR will coordinate the cases of multiple sites with the same radios. Some sites will design the interface; others will evaluate it. The results of all these tests, along with detailed schematics and any needed hardware patches in the wire-wrap area, will be compiled by TAPR for inclusion in the TNC Installation Manual.

Similarly, the Hardware aspects of computer/terminal interfacing will be developed, tested, proven, and documented at the various sites. A description of any adapter that must be fabricated, such as a parallel port for the TRS-80-I or the ZX-80/81, will be compiled for inclusion in the same TNC Installation Manual. Additionally, software guidelines and flowcharts will be sent to each Beta Site for development of drivers to allow all personal computers in the Beta Test to communicate on the TAPR TNC. The software will be documented, tested by other Sites, then compiled and included in the TNC Installation Manual. Naturally, the Tucson group stands ready to assist the various Sites in the attainment of these goals.

Other hardware goals of Beta Test [illegible] ability information and documentat[illegible] tion is considered to be a primary goa[illegible] Hardware group. How often have you p[illegible] piece of Amateur equipment, and paid [illegible] sional price for it, only to find the manual aimed at a CBer? The other cases included no documentation or "service manual" extra (like $25 or so).

The TAPR TNC will include a complete, blow-by-blow description of the circuitry, both at the block diagram and detailed schematic levels. The [illegible]stallation Manual will include complete information for radio and computer/terminal interface, with any needed software drivers [illegible] ware adapter schematics provided. [illegible] will detail the operation of the [illegible] the theory of the TAPR protocol.

The overall goal of all of this testing, documentation, etc., is to make the Packet Mode available to the non-technical Amateur community as well as to the technical, experimentally oriented types. TAPR strongly believes that the advant[illegible] of Packet communication make it imperative that this mode be generally available. Beta is a necessary step in this process. Only after the [illegible]ystem has been thoroughly field-tested will it be released to the Amateur community at large.

As may be seen, Beta Test is not merely promotional hype, nor is it a dissuised marketing effort. It is, in fact, a comprehensive testing procedure designed to maximize the utility and help promote the acceptance of Packet Radio by the Amateur Community. If San Dieso is any clue, Packet will be to the 1980's what FM was to the 70's and SSB was to the 60's.

If you would like more information on Beta Test, or desire to participate, please contact TAPR at the address given at the end of this column. Beta Test will be limited to 75 boards. boards.

Next month, we'll list some of the more commonly heard questions about Packet Radio, as well as the answers. A report on Alpha progress will also be included. ... 73 from the TAPR Hardware gang

On other fronts, Mike Parker, now KT7D, and the Microwave committee have chosen the parts for the solid-state L-band linear amplifier for the AMSAT Phase IIIB transponder. We have a new public relations group, headed by Margaret Morrison, KC7MA, who will be handling information requests and publishing a monthly newsletter. We are looking for volunteers to help with hardware and software efforts, especially people with appropriate backgrounds.

If you are interested in more information on any or all of our activities, please contact us at the following address:

Tucson Amateur Packet Radio
P.O. [illegible]
Tucson, AZ 85734

We are at a critical phase in our development as a group, and could certainly use [illegible] more [illegible] there are persons interested [illegible] radio. Your support at this time will [illegible] difference in the acceptance of packet [illegible] viable medium now and in the future.

73,

[illegible]

:UDD:PACKET:QST_FM_N6EC[illegible]_JUN.13 13-JUN-82 11:[illegible] Page 1

To: All Interested Packeteers
From: Curtis, N6ECT
Date: June 13, 1982

Subject: PACKET A LA NJ

The following message created by Gordon Beattie, WB2CAM and picked [illegible] on the Packet Radio Bulletin Board in Chicago at (312) [illegible].

Just wanted to let you guys know that we're here in New Jersey doing all kinds of things related to packet radio. We have a two meter packet repeater on 146.535 using the Vancouver protocol and TNC board. We have a system of dial-up bulletin boards with on the air via Ham Radio testing under way. The software is available for free !! Just leave a note on :
R.A.T.S. 1 201-887-8874 (MIKE FRIEDMAN WB2WNX)
R.A.T.S. 2 201-785-3565 (GORDON BEATTIE WB2CAM)
The software runs on a TRS-80 model I or III under [illegible].
In conjunction with other groups, we are developing a high speed packet system (RF and Computer) to run at about 48 KBAUD. We are developing a protocol which will provide virtual circuit service via packet radio. This is much superior to the present single hop, non-routed message forwarding technique. The protocol will first be brought up on the TNC boards that the Tucson Group has put together, but we are probably going to come up with a version for the Vancouver boards and naturally for our 48 [illegible] system. For some basic info on our protocol, you can contact us or read the CCITT recommendation X.25, specifically the sections referencing the level three (packet) protocol. If more information is desired we may be contacted at the above numbers or at 201-785-2324 (voice). Please understand that I am often not at home, but with reason feel free to call up until 01:00 or 02:00 depending on whether the next day is a work day!!
73, Gordon Beattie, WB2CAM

To: All Interested Packeteers
From: N6ECT, Curtis
Date: June 12, 1982

Subject: Packet Radio in Sweden

PACKET RADIO at Linkoping University

A strong effort is being made to define and implement a packet radio data network at Linkoping University. The network uses a single wideband UHF channel (~200kHz at ~400MHz) and transmission speed of about 100 kbit/s. The network is completely decentralized and each node is capable to act as a repeater. Long distance connections are possible through multi-hop routing. The routing algorithm is distributed. Programs can be transmitted over the network such that the user may implement his own service functions in distant nodes.

The network users are primarily radio and computer amateurs. Their participation will provide ample possibilities for large scale experiments. As the network has no built-in hierarchy, control is maintained through distribution (over the network!) of proper system software.

At present, suitable low-cost hardware is built and network functions are being defined.

Comments are highly appreciated and may be forwarded directly to Jens Zander or Robert Forchheimer at the following address:

Dept. of Electrical Engineering
Linkoping University
S-581 83 Linkoping
Sweden

To: All Interested Packeteers

From: N6ECT, Curtis

Date: June 12, 1982

Re: Question

What can be done now to increase packet activity and range when local network activity decreases and who can invest the time?

Possibilities are HF contacts, VHF/UHF satellite contacts, or linking to the local VHF RTTY repeater. "Daylight Express" is still a possibility, but requires a lot of work and coordination. Spare time for implimenti[illegible] these projects seems to be one of the basic problems, yet there still seems to be a desire to continue advancing the state of packet radio. So, how do we move to the next step?

HF packet seems to require more equipment, and is limited by the FCC due to transmission speed requirements and an Advance Class ticket. This limits the use of HF packet for the "mass".

VHF/UHF satellite packet, would apparently be the best of solutions for extending the range of contact, despite the problems of address[illegible] and "packet crashes". The coordination of a group of people to establish this kind of link would be tremendous, and would require a lot of self[illegible] devotion to initiate; not to mention the necessity of friends in AMSAT, etc.

A local link to and from the local VHF RTTY repeater would be a nice way to extend the existing packet network and draw more attention to digital communications. Again the question of who has the time to do this work is [illegible]

I know that these are "old" topics, but I feel that they need to be "surfaced" from time to time, if we intend to kee- growing in the world of packet communications. I do have one suggestion that perhaps could get this "ball" rolling. Based on your thoughts, we could address a message to all existing packet stations/nets polling information about who is interested in working in any of the above mentioned topics. This poll could then be maintained within each group, allowing users with special interests the ability of self initiative to contact others with similar or like interests.

Hi Hank:

I have been looking for a way to only print out the last five entries of calls.lossed. The losprint command is a very sood idea, but the Cli that I wrote under cas.los.cli works faster, due to the fact that under a packet connect the control (C) (A) (J) takes lonser to dismount, than issuins the few extra commands in the editor. Sometime you misht want to try this experiment at home:::: First try the losprint, and after you set the 5th line of calls.lossed (in reverse) hit the control (C) (A) (J), and see how lons it takes to set the prompt back. Next try issuins the command cas.los when the (ed. descript.) starts to come up issue the ed command set line; list last.....as the DG is doins that, issue the ed command clear line;list (five before the last) to last;aba..... It takes less time, at least from here. If there was a way to read only the last five entries of calls.lossed via a version of losprint and tail.cli, I couldn't find it; of course I don't have a copy of the CLI MANUAL either.....is it expensive??????

I would also like to begin usins the DG to construct thinss related to packet as per my (same playins/sraphics/hackins). For example, I know how to extract thinss from files usins my own system/lansuasses, but I don't yet know how to do it here..... I suess that a manual is perhaps a sood idea, if you like, you could direct where and how much. I thousht that John would be able to help me, but he has been at Sun, and I rarely see him....

Thats all for now.....

Best

Jose'

[UDD]PACKET]KA6M_FM_N6E[illegible].04A

Hi Again!

Who is Jerry Holter?

Also, I did an audio spectrum analysis of the tones generated by the repeater which you might be interested in.

MST = Most Significant Tones			LST = Least Significant Tones		
2500 Hz	-	5dB+	1000 Hz	-	-20dB
2000 Hz	-	3dB			
1600 Hz	-	0/1dB			
1250 Hz	-	3dB			

Of course this is not a $50K spectrum analyzer either [illegible]...

73, best

Dee

Good Mornins Hank:

I saw a few thinss that you misht (?) be interested in. The first was a 68000-equipped STD Card capable of addressins 16 Mbytes from Texas Computer Services, called the STAR-68K; (for info - Tom Lansley 241-259-6202). The second was a 5v 256K CMOS ROM by Hitachi; cost around $25.; (for info - Chee Ho 408-292-6404). The third was somethins that I really liked, and perhaps would sell my S-100 stuff to set. This computer comes from Micro Source Inc (Ohio); has 2, 386K byte drives, an 8 slot STD bus, 9 in. GP/CRT, a VT 100 style keyboard, 1 rear connector for optional 8' disk, only 4 cards, CP/M 2.2, and comes in a portable, shielded case that weighs around 30 lbs. The asking price for the above is around $1900.00, which (?) isn't too bad. Just think, a combination packet repeater, TNC, and personal computer all in one package and portable. I spoke to the factory and also found out that it not only has AC/DC connectors to power it, but a battery pack is on the test bench, and will be available soon. Anyway, don't know if you are interested in this info, but..... Have a nice weekend!! Hi to Sarah, Nick, & Cindy! 73, Bert

TO: Hank
Fm: Jerry W6OCP

Well, I got them transferred ok apparently. All 23 start
with "rt", so a "f rt+" should list 6 ".c" C source files,
6 corresponding ".h" headers, 3 ".asm" 8080 source files, 6 ".sub"
submit files, and 2 ".doc" documentation files. "rtbuild.doc" contains
construction steps, and "rttyuse.doc" is a brief list
of instructions for use.
Let me know if you have any questions or problems. I suspect there
is a lot that is not clear about the whole process.
Have fun!

Hi, Hank. I have assembled 23 source and doc files for you
for my CP/M file programs but am having trouble sending them to the
MC. The trouble seems to be an overun error caused by the expansion
of tabs taking so much longer on echo than sending the ascii tab char
takes. I confirmed this by sending a long stream of tabs alone.
Is there a way to shut off tab expansion or possible even
shutting off echoing (though not sure how i'd know the transfer
was complete without echo)? Otherwise I'll have to write
a filter to expand the tabs to spaces so I can send these files to the
MC without error.

Hank,
Jeff Sue will probably go to San Diego for the conference.
I told him you would be interested in having him as a panel
member. You may want to telephone him.

Bob

|UDUIPACKET|KA6M_FM_N6FCT.01A 1-JUN-82 [illegible]

Hi Hank!
Just a few questions. I couldn't find WB2GDQ or W6OCP in the user files, and KA6STG has a new call N6GJH. Wondered if you would mind making an update to the appropriate file?
73, best -cas-

[UDIPACKET]POST_FM_N4ECT.JUN.01 1-JUN-82 10:53:14 PAGE 1

To: All FPRBBSFD:Packet@@re

From: Curtis, N4ECT

Date: June 1, 1982

Re: Calls Logged May

N4ECT	67
W4JHJ	53
WB2GDB	32
W4RAM	30
N4ABT.J	26
WA4JFZ	25
N4BJH	21
W44KD	14
KD4LI	09
K4VEQ	09
WA4BLF	05
N4FQA	03
K4AM	03
K4HWJ	03
WA4NAN	02
W4FTZ	02
WB4BDE	02
WA4PZW	01
WA0CP	01

There were 19 individual stations that logged into the N4AM Packet Central
131 calls were made via the telephone
174 calls were made via packet radio
There were 305 calls logged onto N4AM Packet Central for the month of MAY.

To: All packet stations
From: Herb

Ref Terms out CALLS.LOGGED

It is frequently of use to look at the last few entries in the log file: CALLS.LOGGED, to see who was on the system, who's on now, who was on last and didn't disconnect, etc.

A new command will now print the log in reverse order, using the system utility program TAIL.PR.

LOGPRINT

To stop it, enter ^C^A LF

Thanks, Herb

Hi Hank!

This is a short note to inform you that I might not be able to attend Tuesday's meeting as I am leaving in a little while for a shoot. I am not sure weather-wise or not I will be back in time...

Rewards, 73, best to all.

-ERR-

TO: HM
FROM: PLR
SENT: 29 MAY 82 15:41:34
READ: 29 MAY 82 15:57:20

TO : Steve, U2FPY

Re your msgs of May 19,

1. Concerning the existing 1200-baud Bell 202 'standard,' I think that I agree with your basic point that we should not keep it any longer than we have to. One problem, of course, is that the FCC Rules presently limit us to that speed on 10 meters thru 1 3/4 meters, so we can't toss it overboard until that restriction is lifted. Also, the problem breaks out into backbone vs. local area nets. For the backbone net, I think that we should graduate to something faster as soon as possible. Local area nets will probably be slower to convert until they get some hosts running local services which use some appreciable part of the channel capacity. On paper, the FCC situation is as follows:

a. In PR Docket No. 81-699, RM-3788, the FCC proposed that "Sending speeds as great as 19.6 kbps may be utilized on those frequencies between 50 and 225 MHz provided that the bandwidth of such emissions does not exceed 16 kHz."

b. AMRAD's comments which were filed January 12, 1982 recommended that between 220.5 and 221.5 MHz the speed limit be raised to 56 kb/s. The ARRL agreed with us and supported our comments in their reply comments of February 16, 1982.

c. Also involved is that the FCC proposed changing the Rules to specify "bits per second" rather than "baud." Bob Carpenter, W3OTC and AMRAD recommended that the FCC stick with "bauds." However they come down on this may affect our choice of modulation.

2. Yes, we are interested in the MSK encoder/decoder, as well as anything that you might have comparing MSK and PSK.

3. The rumor that someone in AMRAD has the VADCG TNC boards is probably just rumor. We've asked the most likely people and haven't located it. The main problem that we see with the VADCG board is the limited memory. Terry Fox's article in the June AMRAD Newsletter is one way of temporarily getting more memory for the purpose of developing network-level software. We'll be looking at the TAPR board too.

73, Paul, WA6RI

Hello Hank. Two minor points: 1) How about if, on signon, the computer wouldn't ask us if we had our callsigns right if we had come in on the packet port? 2) Could you please send me a message about how to get to Harry's from 280? I seem to have misplaced the last set you gave me. You might consider including them in the general bulletin that you send each month as well. Does ADS have a way of typing all files created after a certain date? Does DG in SF still give away manuals for the asking, or do you have any idea? Does ADS have a /N switch, used as follows under RDOS:

TYPE + QST+/N where it would type all files that didn't start with the string QST? Is there an equivalent?

I went to figure out ADS, if for no better reason than it's a node on that I have a free connection to. Is there any particular time of day or night that I could spend an hour or two straight on the machine? E.G. 2 AM, or what is the least crowded time? Is amateur radio filled with as many midnight hackers as computers? Anyway, enjoy Memorial Day, and we'll see you Tuesday.

Thanks, Rick

Date: 28 May 1982
From: Hank Magnuski
To: All Packet Stations

The next general meeting of the Pacific Packet Radio Society will be

Tuesday -- June 1st, 1982 -- 8:00 PM -- AMPEX Cafeteria

This meeting will be hosted by Bob Reiling, W6JHJ and Dave Ensle, N6FTZ, who will discuss problems associated with establishing a second repeater in the Bay Area.

For those wishing to have dinner together prior to the meeting, come to Harry's Hofbrau (84 & El Camino) at 6:30.

The AMPEX Cafeteria is located in Redwood City on Broadway, two blocks south of Route 84. From 101 take 84 West (Woodside Road/Seaport Blvd.) to the first left which is Broadway. Go south two blocks and look for the AMPEX buildings. There is a pond and a flagpole in the center of the complex. The cafeteria is the first building on the north side of the pond and has many glass windows.

Hi Assin:

I got bothways to work, as my error was being in :utils instead of :udd:packet. There were some problems that I encountered; for example: after I got the prompt (What is the name of the file to print?) I entered (how.to.use); it then gave me the prompt (Enter first and last page numbers) needless to say, I didn't know what to enter, so I tried (1 10) at which another prompt appeared (Enter the value of the desired offset), I tried enterins (0); the next thins that appeared was (Enter New-Line when ready); at which point I entered (control J). At this point, my printer spit out form feeds and the prompt (Any more printing from this file? (Y/N) came up. Well, nothins printed.... what did I do wrons? (perhaps an example is in order)... Another thins that I should mention is that everythins that I dumped after this experiment came out in an unformated print, jammins my printer, I was able to eliminate this problem by lossins out, and then lossins back in. Thanks for takins the time this mornins to help me out, I appreciate it and know that you are busy... Think that someday I will become a DGS-120 wizard (chuckle)?????? One of these days, I would like to afford a system manual... that would probably help for starters....

73,-Jim-

Hi I tried all + ways to x bothways. The one that seemed to work to a
point was (x bothways), where the title came up "What is the name of the
file to print? Before I could enter a file the following appeared:
ERROR REPORTED BY 14013
  CALLED AT 12000+164
ZERO LENGTH FILENAME SPECIFIED
Also, about the basic file what is (ci) and is sysfun.ci a basic program
that can be executed via (x sysfun)?
-cas-

Good Morning Hank:

Thanks for the reply re "bothways", I will give it a try, when I have some extra time for experimenting. Now, what to do about Tuesday's meeting. There are a few things that are still open in our ranks; i.e. Daylight Express, the formation of a non-profit society, upgrading society equipment, the addition of a second repeater +, how to link to VE3QB's HF packet station, the steps necessary in linking packets through the upcoming satellite, new frequencies and experiments in other areas of the VHF/UHF bands, changes in the tx/rx software using call signs, reports on the use of the new VADCG modem, and the possibility of starting a new series of seminars for new prospects to packet radio. I am sure that I have overlooked others, but this is what has come to mind. Perhaps, we could postpone the next meeting and map some of the above things out on paper or the DG, and present them at a PPRS meeting later in the month of June, or maybe it is time for a steering committee again. Now that the VE's have thawed out, there will probably be an abundance of new material out, not to mention all the mods that are being suggested for the TNC i.e. 2708 to 2716, etc. Another thing that we discussed before, was a "packet clinic", where members could bring in their radios and test equipment to peak up to "primo packet tx/rx". There are a lot of things that could be covered, but I FEEL, that they should be planed. Another thing that I noticed, was that there was no mailing for the last meeting, and aprox. 10 members showed; this of course is indicative of a core group, which is not too bad. I have also noticed that the Spring is a very busy period of time for most people, and maybe the reason for lack of attendance. I believe that a steering committee meeting would be more in order, making sure that those participants are notified. I talked to Brian, KD6LI, the other day, and he mentioned that he got married last month, so I would imagine that the "honeymoon", replaced packets for a little while (chuckle). Well that's all I can think of, at this point... we still have a few days to kick it around. If we do postpone the meeting, I think that it would give us the time to really get something together, and do a "newsletter" type mailing, which I will take responsibility for.....73,best ---- enjoyed your visit with Nick -- neat KID ---

Date: 26 May 1982
From: Rick, N6GJH
To: All Packet People

I'm looking for a 2 meter FM rig to use in running my packet station. It can be crystal or synth. My only requirements are that it must run off 120, be solid-state, working and include documentation. It must also be inexpensive. If anyone can help me out, please drop me a note here or give me a call at (415) 435-4891 between 3 and 10 PM.

Thanks, Rick

Hi Hank;

Is there a tool on this system, that will allow me to fully utilize my Diablo printer; re bi-directional printing. Diablo.cli is not quite what I wanted, and I have been denied access to Printer.cli. Just curious, and thanks for the note; glad you and Nick had a good time. Did Sarah like her new T-shirt (chuckle).

73, best -cas-

To: All PPRS@SFO Packeteers

From: N6ECT PPRS@SFO "Curtis"

Date: May 24, 1982

If you have a few spare moments would you jot down on a piece of paper the Make & Model number of the radio that you are using to tx/rx packets. Also, could you draw a schematic of the connection of your radio to your packet hardware; i.e. mike pin and speaker configuration, resistance, PTT to RTS, etc.

Now, if you bring this to the next meeting, or send it to me (the info/schematic), I will create a file under DOCS that will keep tabs on what we are using on the air. I will take the schematics and other notes and put them into a PPRS History/Log, maybe redraw and reorganize them, and make them available to the members.

I feel that this information will be an aid in helping new packet-ears get on the air as well as being reference pool in the future.

73, Best Curtis

Hi Hank. Just managed to receive the repeater beacon... I'm overjoyed. You can add me to the "up" list - Hope to set the transmit side of things running ASAP. Talk to you later!

Date: May 21st, 1982
From: Steve, WB2GDQ
To: Hank

How should I arranse payment and shipping with VE7ADE for one of their 0273's @$44.00 + expenses. I am anxious to get going and ELMAR doesn't even know when they might get some in.

Thanks again,
Steve

Dear Hank:

I am at a point of estatic bliss, as I was able to dump two long mail files this morning. The repeater signal maintained an S-15 to S-20, during the entire tx/rx, and I was able to go back to a 1 watt tx. I am sure that this will make several people very happy, like Mojo, cause you can't believe how frustrating it is to only get half way through a mail dump, and have the repeater lose strength. Special regards to Stu, and thank him for us if you get a chance to talk to him before we do.

I was thinking about Sarah this morning, as it is my oldest daughter's birthday today -- 14 years old. That puts me headed towards being a grand-father sooner that I thought (chuckle). Anyway thanks for your part in getting the repeater up to snuff. (When are we going to try two repeaters?) Best to Cindy, Nick, Sarah and hoping that you have a good weekend.

73, -ees-

TO: HM
FROM: JS
SENT: 20 MAY 82 08:00:31
READ: 20 MAY 82 15:58:33

Hank,

We have about 15 on hand with sales of one or two per week. I have placed an order for 50 more which Intel promised would arrive in six weeks time. This is the Van. distributor. We had quite a wait for the others, which came from the Seattle distributor. Our singles price is $44 US. This next lot has been promised to me near the 1000's price. I don't know if I could get a better deal if we went for more or not.

Are you aware of any sources or would you like to get some from us? We have quite a good supply of the other parts for the TNC. Assembled 1200 baud modems too.

I am busy right now debugging our new version of the TT program. We will be sticking it in any EPROMS we sell, including the kits.

73 es cul
John, VE7ABE

TO: HM
FROM: SER
SENT: 20 MAY 82 03:29:41
READ: 20 MAY 82 05:38:30

Dan,

I just spoke with Tom Clark, W3IWI, concerning the interim modulation standard. I'm afraid I've committed a faux pas by even suggesting AFSK FM techniques for Phase III-B. Unless you've got an EME quality station, it's unlikely that you'll squeek even one packet through without a bit error. We need to do the following:

1. Do the link calculations for the previously proposed and now inoperative standard (I'll do this on my end, too, and we'll compare notes).

2. Come up with a liveable modulation scheme, even if it means building an AFC loop to track the doppler shift.

3. Do link calculations for the new standard.

4. Build some prototype hardware. This is a tough one... I think we can justify the work by pushing the baud rate up in the terrestrial packet activity. I'd like to have a direct hand in this one.

Other subjects of conversation included holding a Workshop and/or a Symposium on satellite techniques (including digital communications) prior to the AMSAT annual meeting. Tom needs input into this one, as well as participation from the rest of the country (read between the lines, 'we need your participation'!).

Lastly, Tom is one of us - a packeteer. He is going to be instrumental in the planning, and allocation of AMSAT resources to satellite packet radio activity. Let's try to get him on Arnet. How about it?

73, Steve w2fpy

Date: May 19th, 1982
From: Steve, WB2GDQ
To: Hank

Please forward a request for 2 of the class 220 MHZ stations from me to whomever is coordinating the orders.

Any word on the 8273?

Thanks again,
Steve

TO: HM
FROM: SER
SENT: 19 MAY 82 13:14:20
READ: 19 MAY 82 18:28:30

Hank -

With the '2' collision, I WAS hoping Steve was in our area... Oh, well... His suggestions on the VADIC board sound appropriate. My preference would be to doctor the negatives and reshoot the board with decoding forthe 2K x 8 EPROMs and RAMs, eliminate the 2114 sockets, and put [decoded] 24 pin sockets (eight of them) across the top of the TNC board.

As an aside, Hank, I have been thinking more and more about the implications of the TAPR protocol (although I still can't see it in its entirety). By definition, the GLOBAL network will be a WEB type topology. Even regional nets will have a WEB RATHER THAN A STAR-TYPE STRUCTURE. In principle, why not extend that to the local net? Maybe its the aesthetics of it - you know, the symmetry - but I think TAPR is heading in the right direction for an amateur network...

About AMICON, I think we have a reasonable interim document. When do you want to 'publish' the protocol/hardware interim specs?

Forgot to mention the 220 radios.... I spoke with Ed Cless the other day, and he has been doing a little foot-dragging. I hope he'll go through with it soon, but he is in the process of merging with another company and hasn't had the time to do the inventory. It is based on this inventory that he will calculate the going price for the FM-21s. Mine has been in service and interfaced with the TNC board for quite some time. It has been eminetly reliable. Expect the going price for the FM21s to be in the range of $30 to $60, depending on that inventory. Also, let it be known that I do NOT intend to profit from this venture. Aside from postage/shipping charges, any packeteer desiring an FM21 will get it at my cost - until the supply runs out.

- Steve, W2FPY

TO: HM
FROM: PLR
SENT: 19 MAY 82 02:02:55
READ: 19 MAY 82 04:18:40

To : Hank
From: Paul
Subj: VADCG TNC Memory Expansion

Thanks for the info from Steve Gross, WB2GDQ. As coincidence has it, Terry Fox, WB4JFI wasn't able to go to Dayton because of work commitments. Instead, he stayed home and worked up a mod to the VADCG TNC board. Here is an article, written by Terry, for the June AMRAD Newsletter which is ready to go to press now. (You'll have to wait until you get the newsletter for the Fiss.)

VADCG TNC Modifications

Terry Fox, WB4JFI
1819 Anderson Rd
Falls Church, VA 22043
703-356-8334

I have found that we are rapidly approaching the limits of memory on the Vancouver Amateur Digital Communications Group (VADCG) Terminal Node Controller (TNC) board. It is just barely able to handle the link level software in the four 2708 EPROMs used on the board. This means that any network-level software must be done external to the TNC board. One approach is to come up with a new TNC board that has more memory on it, both RAM and EPROM. The other option is to expand the capabilities of the VADCG TNC board. I should point out at the outset that this modification is a kludge, but at least it works! Only one IC is added to the board, and it is put on the board dead-bug fashion (upside-down).

This modification is done in two parts, first the RAM on the board is moved from its present location (1000-1FFF hex) to a new location to allow more EPROM memory. The new location is 8000-8FFF hex, which should allow up to 32k of EPROM memory. This location also simplifies the hardware modifications required. The second half of the modification changes the EPROM sockets to allow the use of either 2716s or 2732s.

Relocating RAM to 8000 Hex

This part of the modification requires the addition of another IC, called U27, which can be either a 74LS138, or an 8205. U27 becomes the RAM address decoder, while leaving U8 the EPROM address decoder. I should point out that the schematic that I received with my VADCG TNC board has some minor errors. One of these is that address lines A8 thru A15 from the 8085 (IC-1) are backwards. A15 is pin 28 of the 8085. A14 is [illegible] 27.

etc... down to A8 beins pin 21. Usins the proper pins is important to this modification, so be careful of this error.

When this portion of the mod is completed, the TNC should still operate usins 2708s for the EPROMs. I recommend that the board be completely assembled and tested before doins any modifica tions. Have someone burn a couple 2708s with repeater software for your call in them, one ver sion for RAM at 1000 hex, and the other version for RAM at 8000 hex. Even if you don't use your board as a digital repeater, it is a sood test of the TNC, and usually will fit in one 2708. Test your completed TNC to make sure it functions properly. Refer to Fis. 1, 2 and 4 while doins this mod. I have laid the mod out in steps to make it easier to follow and check off. Cuts on the board are shown as a small X thru a trace.

1. Cut traces between U8 pins 7,9,10,11 and U19 to U26 pin 8. The cuts are done by U8 with pins 7, 9, and 10 cut on the top (Fis. 1) while the pin 11 trace is cut on the bottom of the board (Fis. 2).

2. Cut the trace at U8, pin 3 to sround (Fis. 2). Hook U8, pin 5 to U1 (8085) pin 28 (A15).

3. Drill two holes as shown in Fis. 1. These holes facilitate the wirins of U27. Be careful not to drill thru any traces.

4. Add IC-27 (74LS138, or 8205) to the board as shown on Fisure 1. It can be glued to the board if necessary, or use double-sided tape. Put a 16 pin solder-tail socket to it to allow replacement in case it should fail, and wire the pins as follows:

A. U27 pin 1 (A0) to U1 pin 33 (A10).

B. U27 pin 2 (A1) to U1 pin 24 (A11).

C. U27 pin 3 (A2) to U1 pin 25 (A12).

D. U27 pin 4 (E1) to U1 pin 34 (IO/M*).

E. U27 pin 5 (E2) to U7 pin 11 (RD/WR)

F. U27 pin 6 (E3) to U1 pin 28 (A15).

G. U27 pin 8 (GND) to sround bus as shown.

H. U27 pin 12 (O3) to U25+26 pin 8 (CS*) at cut

I. U27 pin 13 (O2) to U23+24 pin 8 (CS*) at cut

J. U27 pin 14 (O1) to U21+22 pin 8 (CS*) at cut

K. U27 pin 15 (O0) to U19+20 pin 8 (CS*) at cut

L. U27 pin 16 (+5V) to +5 volt bus as shown.

Now that U8 is only used for EPROM's while U27 is used for RAM, U8 doesn't need to be enabled selectivly with WR, but just with RD from U1. U27 needs to be enabled with either RD or WR from U1. These changes are done by rewiring U7, the 74LS00 as follows:

A. Cut the trace between pins 3 and 4 of U7 on the bottom of the board (Fig. 2.) This trace is thick; so check with a meter to be sure it is totally cut.

B. Cut the trace between pins 6 and 10 of U7, located on the bottom of the board (Fig. 2).

C. Cut the trace between pins 14 and 13 of U7, also on the bottom of the board. This is also a thick trace; so check the cut.

D. On the top side, cut the trace from U7 pin 3 to the small feedthru as shown in Fig. 1.

E. Wire U7 pin 2 to U7 pin 4.

F. Wire U7 pin 5 to U7 pin 9.

G. Wire U7 pin 6 to U7 pins 13 and 12.

H. Wire U7 pin 10 to U7 pin 14 (+5V).

I. U7 pin 11 should be hooked to U27 pin 5 from step E of adding U27 above.

Double check your wiring. It should now match the schematic in Fig. 4. If it does, install the EPROM that has software for RAM at 8000 hex, and try out your board. If everything is working, the TNC should operate as if unmodified. If not, recheck your wiring for mistakes.

Your board now has the RAM relocated to 8000 hex which will provide a lot of address space for the new EPROM added in the next steps.

Changing the EPROM to 2716 or 2732

Since there are only four EPROM sockets, the TNC is severely limited in how much software can be run. I feel that if a separate processor is used to generate and receive packets, it should be able to run most all of the networking overhead, not just the link level. The four 2708 EPROMs are just about full with only a bare-bones version of the link-level software, so there is no room left for the actual network software or anything above that level. This mod will allow the use of 2716 or 2732 EPROMs instead of the 2708s being used. This will change the maximum EPROM capability from

the present 4k to 8k (4-2716) or 16k (4-2732). An added feature of this mod is that the minus 5-volt power supply is no longer used, and can be eliminated.

Part 1 of this mod pertains to both 2716 and 2732 EPROMs, while part 2 should only be done for the type of EPROMs to be used.

Part 1, 2716 and 2732 Mods

Do this part of the modification for both 2716s and 2732s. Again, the mod is done so that your progress can be checked off.

1. Cut and isolate pin 18 of U15, U16, U17, and U18 from each other and from grounds at both U15 (top of board) and U18 (bottom of board).

2. Cut traces between U15 thru U18 pins 20 and U8 pins 15 to 12. Wire as follows:

   A. U15 pin 18 to U8 pin 15.

   B. U16 pin 18 to U8 pin 14.

   C. U17 pin 18 to U8 pin 13.

   D. U18 pin 18 to U8 pin 12.

3. Cut the trace hooking U15 thru U18 pin 19 to ground at some point between U18 and the ground bus. Hook the U15 to U18 pin 19 trace to U1 pin 23 (A10).

4. Wire U15 thru U18 pin 20 together and tie them to ground.

5. Cut the trace hooking U15 thru U18 pin 21 from the -5 volt bus between U18 and the -5 volt bus as shown.

6. Cut the traces at U8 pins 1,2, and 3.

Part 2, 2716 Wiring

6A. Hook the trace of U15 thru U18 pin 21 to a +5 volt bus (U18 pin 24 is OK).

6A. Wire U8 pin 1 to U1 pin 24 (A11). This can be done by hooking U8 pin 1 to the trace just cut from U8 pin 2, which is A11.

6B. Wire U8 pin 2 to U1 pin 25 (A12). This can be done by hooking U8 pin 2 to the trace just cut from U8 pin 3, which is A13.

6C. Wire U8 pin 3 to U1 pin 26 (A13). This could also be wired to ground, but wiring it to A13 will allow more EPROMs to be added later on.

This completes the modification. Plug in a 2716 with some software in it and try it out.

Part 2, 2732 Wiring

3A. Wire the trace connecting U15 thru U18 together to U1 pin 24 (A11).

6A. Wire U8 pin 1 to U1 pin 25 (A12). A12 can be picked up from the trace just cut from U8 pin 3.

8A. Wire U8 pin 2 to U1 pin 26 (A13).

9A. Wire U8 pin 3 to U1 pin 27 (A14). Pin 3 could alternatively be hooked to ground if no additional EPROMs are going to be used.

This completes the 2732 modification. Plug in a 2732 with some good software in it and give it a try.

Additional Memory

These modifications leave room for further additions to both the EPROM and RAM space. To add more EPROMs might require some swift work, as additional EPROMs cannot be piggy-backed. One approach might be to kludge sockets onto the back of the board, and wire them to the present sockets, except for the chip-select pins. These are hooked to the remaining enable outputs from U8 (pins 11, 10, 9, 7) as required.

The RAM is easier to expand. Just piggy-back the additional 2114 chips on top of the present ones (U19 to U26) except for the chip selects (pin 8), which go to U27 pins 11, 10, 9, and 7. This will double the RAM on the board from 4k to 8k.

Make sure you remind whoever burns your EPROMs which ones you are using and that your RAM is now at 8000-8FFF hex. Happy packeting!!!

TO: HM
FROM: PLR
SENT: 19 MAY 82 01:14:08
READ: 19 MAY 82 04:17:53

TO : All
SUBJ: Am7910 Single-Chip Modem

You will be interested in reading the May 12 issue of EDN Magazine. More specifically, I refer to the article, starting on page 143, entitled "Single-chip FSK modem expands your design choices," by Michael K. Stauffer of Advanced Micro Devices Inc.

In one 28-pin chip, the Am7910 is able to become a Bell 103 originate, Bell 103 answer, Bell 202, V.21 originate, V.22 answer, or several flavors of V.23 by setting mode-control input lines.

I called Mike Stauffer for some more info. He said that samples would be available mid-June with production in August-September. The onesy price will be in the $35-40 range initially with quantity prices dropping to the $10-15 ballpark as they move down the "learning curve." The guy at AMD to talk to about samples, prices, and other marketing info is Ray Lett, 408-732-2400 ext. 3774.

This chip looks good not only for Bell 202 packeting but phone-line applications. I intend to follow up on this and possibly build up something using this chip. I would appreciate any developments on this chip for the AMRAD Newsletter.

73, Paul, W4RI

Date: May 18th, 1982
To: Hank, KA6M
From: Steve Gross, WB2GDQ
Re: VADCG TNC Memory
CC: Paul Rinaldo for AMRAD Bulletin

Here is the summary of memory modifications which you requested me to document:

I have wired up my board for 5 volt only EPROMS, but I am having trouble finding 16K Rams in a 4K by 4 arrangement (which can be placed where the 2114's are currently). This can be done by replacing the 18 pin sockets with 20 pin sockets as all the wiring stays the same except for the two new pins and the old VCC pin which becomes an address line. The only versions which I have found so far are the 70ns (and faster) Inmos chips, although the 2K by 8 variety seem to be quite cheap and in large supply. Unfortunately, there are only 4 - 24pin sockets on the board, so modifying it to handle that configuration by adding additional sockets would be significantly more difficult.

So, for the moment, I think I'll leave the address decoding as is and use 2716's as though they were 1K by 8 roms. At least that way I can use the 5V only chips and eliminate the -5V supply from the board. The modification to do so is very simple. The +12 volt and -5volt lines on the 2716's are disconnected from their respective power supplies (just where they connect to the supply rail) and are replaced as follows:

Pin	old	2758	2716	2732
19	+12v	gnd	A10	A10
21	-5v	Vcc	Vcc	A11

For the 2716 and 2732 mods, either an additional 74LS138 must be added or ideally, 2732's and 4Kx4 static rams can use the same 74LS138 and just change the following inputs:

Pin	name	old	new
1	A0	8085-22	8085-25
2	A1	8085-23	8085-26
3	A2	8085-24	8085-27

Note that the 8085 pins are mislabeled on the VADCG TNC schematic and the pins should be as follows:

8085-21	A8
8085-22	A9
8085-23	A10
8085-24	A11
8085-25	A12
8085-26	A13
8085-27	A14
8085-28	A15

That concludes the mod's necessary to quadruple both the ram and rom address space. Note that if you are willing to partition your ram into disconsuous 1K blocks (or 2 discontisuous 2K blocks) you can make the 2732 mods and continue to use the 2114 rams but quadruple your prom address space. With the current low prices on 2732's. You could also double both your prom and ram address space by using a pair of 2732's (8K total), the original 2114's (4K total) and 2 6116's (4K total RAM). This change would require

that the ROM write-inhibit logic be disabled (U7-pin 4 grounded instead of tied to U7 pin 3, for example).

Steve

FILE ka6m.fm.n6ect.18
RECORD FORMAT: ----

Hank: More info re repeater. After continuous use, I have noticed that the signal strength of the repeater starts at S-20 and then starts to drop, until it goes below S-5. When it sets around S-5, that is when I start to have problems. The other day, when I left you the two notes, and tried the test.file, and then tried the nuke.txt, the repeater slowly began to lose strength, so at the end, there was no repeater. I also noticed that it took about 27 mins to bring up the DG this AM. I have received a 4800 baud infrared modem for testing purposes, which I hope to link to the aux port of my terminal, for retransmitting packets to a non "ham" for educational verification of short distance point to point communications (aprox 100 meters). One other thing that might be of interest to you is that we will be testing a situation using the TRS-80 color comp. to unravel the NOAA weather pix (and get this) using the unit basically "as is", with software being the driver. I will let you know the results. We had to modify the mix a bit, to compensate for the extra lines, but have the map and the NOAA loso 100% for sure. We hope to make this public domain, but would like to keep it under wraps for a little longer, at least until we are throush testing. It might be interesting to bring this up on a packet port, if it works. I notice that the rep. is now an S-9, and the ack is getting worse, so I will end now... time on DG aprox 30 mins.. a drop from S-20..., better so now 73, best -cas-

FILE ka6m.fm.n6ect.18a
RECORD FORMAT: ----

Signal now below S-9 aprox 35 mins on DG. -cas-

FILE ka6m.fm.n6ect.18b
RECORD FORMAT: ---

Time on DG aprox. 45 mins. typed test.file which took a about 3 mins (FB) and the repeater strength has held at around S-9. Guess I will end my tests for this morning. Glad that I was finally able to use the DG """trouble free""" 73 again and best to all..... -cas-
will probably log in later to try adventure test...

FILE ka6m.fm.n6ect.18c
RECORD FORMAT: ----

Repeater strength now below S-5. I self connected and ran long files until the repeater strength dropped to S-5. I am waiting a few mins before I transmit each sentence and am watching the strength come back up to S-9. On the last repeater ID, I saw the CW start at S-9 and by the time the data finished being transmitted the signal was below S-5. V E R Y I N T E R E S T I N G... hope this info helps. signal strength from the repeater now S-7 on tx/rx... -cas-

P.S.
Test.file took about 5 mins., with 8 arrox. 20 second delays.
A few of the above mentioned delays were around 10-15 secs.
Just for the record....73, -cas-

Thanks for checkins things out, as I am now able to
make it into the DG via packet. Larry musta spoiled
my thinkins a little, when he mentioned that their
repeater had been up 100% without maintenance (chuckle).
Anyway, better not take any chances -- so -- 73, -ces-

Good Mornins Mr. Pherpes..(chuckle)
I tried the same thins this nmmornins 1st - via packet the repeater worked, but I could not los in via the DG 2nd - I tried 1200 (no so), but I called another system I work 1200 and no problem... If you will look at the los, you will notice that it has been a while since I thave made it via the radio.... or even for that matter... (the other active user up here hasn't made it in either. Now, you know that I usually try to make it once each day.. I can conN6ECT to myself, but well.....) Don't think that I am bitchins... as that is not the case, just tryins to find out why....
73, -ces-
P.S. meanwhile back to 300...

Hank,

I have finished building the Vancouver TNC board. I have sources for everything except the 8273 and the 8250 (which I should be getting from you). Do you know what the best source is for 8273's (price/delivery)? I am using 7216/2532 eproms on my board and am considering using 4K by 4 rams instead of the 2114's at some future time.

Are the .asm sources in !usr!packet up to date? I have copied them and translated them to z80 code and they assemble with no errors on my z80 assembler. Unless I hear that I should do otherwise, I will program my 2716's from those files.

Thanks much for your help, and I hope to see you on the air soon!

Steve Gross
WB2[illegible]

Hello Again:
This mornins, I tried bothe packet---No GO---- then I tried 212A--
No GO ---- there too, so I am here at 300bps.. Where you able to find the
cause of not beins able to reset the DG... or why there has been a problem
in the access.... other than that.... have a nice friday..and enjoy the
weekend..

73, best --cas-

Good Mornins Hank:

First of all I want to thank you for (pushins-chuckle) for me to meet Larry. I had a sreat time, and found him to be a very interestins sentleman. I even think that he was able to spark up my interest again to pursue new lines re packet.

Second, I am still havins a hard time 1). resetins the DG & 2). accessins the DG. Woody said this mornins that he was soins to construct a new power supply for the radio, and felt that would eliminate a lot of the problems. I think that there are others in the same "boat", as the last time I spoke to Mojo, he mentioned that he has not been able to "really" set into the DG, since the KA6M repeater was removed. I realize that everyone has been sorta busy this time I year, and I REALLY appreciate Stu's efforts to have the current repeater "up-to-snuff".

If there is anythins that I could do let me know.

73, best to you and yours.... and when can I QSO with Sarah?????

-ces-

Hank:

I am sorry to say that I have to be other places tonisht, and probably will not be able to make it tonisht. I want to apologize to Larry and Bill for not beins able to meet, as I had looked foreward to it. Got to video a show up North.

73, Best All Around

Curtis, N6ECT

TO: HM
FROM: DC
SENT: 12 MAY 82 06:28:49
READ: 12 MAY 82 19:37:50

To: all
From: Den

I have placed copies of the June TAPR newsletter and a short article I have written on protocol on the net. See below.

73,
Den

As summer continues down here (it starts months before other people's summer), We finally are playing with our own boards! We are very busy with the software effort, and have been modifying hardware design, layout, protocols etc. as the Alpha test nears completion. See Lyle's hardware report for some of the details.

TAPR will be looking for groups of hams who are interested in helping us with testing the Beta version of our board, to prove the system in real environments, and find improvements in the protocol required to handle real-life problems. We also are setting up a second set of tests, to be performed by the same or additional Beta test sites, using software provided by some standards agencies to determine the applicability of different standard protocols in a packet radio environment. We beleive this kind of experimentation is very important for amateur packet radio at this time, and performs a unique service, providing a testbed far larger than these agencies could ever hope to realize.

Our programming effort has shifted now to developing the FORTH primatives for interfacing to the on-board components, and to creating the state sequences necessary to effect the dynamic addressing protocol we have chosen for our first efforts. The higher-level routines are written, and the VADCG-compatibility program elements will also be worked on this month.

TAPR Hardware Report

Alpha boards are here! The PC released the boards on April 5th, and during the next several days the twelve Alpha testers took delivery of boards, documentation and brown paper sacks filled with parts. Soon the sacks were empty and the boards full. Those of you who were at Dayton got a sneak preview of an Alpha board, courtesy of Pete Eaton, WB9FLW. And we certainly appreciate the constructive comments made at Dayton regarding the TAPR TNC --wait 'till you see the Beta boards!

Due to some job commitments, forced travel, examinations and other events that somehow set in the way of more important things such ac Amateur Radio, the Alpha test phase is a bit behind schedule, to no one's complete surprise. Nonetheless, considerable progress has been made. By May 8, the following Alpha-level hardware goals had been achieved:

* interface of the TNC to a variety of terminals/computers

* self-test at power-on with status report

* activation of the HDLC controller

* activation of the CW ID facility

* verification of parallel port operation

* verification of NOVRAM interface

* verification of the watchdog timer function

* verification of the modem design and interface

* on-board calibration of modem frequencies to +/- 5 Hz.

In addition, a major software achievement was realized on May 1, when N7AIG, aided and harrassed by WA7GXD and Mark Baker (TAPR secretary, no call yet), got an advanced version of STC FORTH running on the TNC in a standalone configuration. This was a major test of N7AIG's MetaFORTH target compiler (running on his Apple), and Dave's efforts have made the Hardware Committee's debugging and low-level driver coding tasks much easier.

It is now anticipated that TNC's will be talking to each other in the very near future. Hardware efforts will then turn to Beta activities, including a meeting with the Computer-Aided Design (CAD) boys for possible computer-generation of the Beta artwork. Component suppliers are beating our doors down in an attempt to make the Beta (and beyond) boards lower in cost, and We're listening! Our goal is to make the TNC, as well as future developments, available to the entire Amateur Community on a non-profit basis. (Yes, we are capitalists, but we just don't beleive in making money off of our Amateur bretheren.)

Now for a look at the microprocessor side of the TNC design.

The TNC has a specific mission -- implement the lowest layers of packet protocol. Since the

definition of these layers is in a state of flux, the TNC must be very adaptable. This implies programmability, and in today's world, this means a microcomputer. Thus, the TNC is a small, dedicated-function computer.

Naturally, virtually every silicon foundry has a pet microprocessor (uP) and they are not necessarily compatible with each other. Every family in the microprocessor world has its unique, special function peripheral parts, and some of these are very useful in the specific case of a TNC design. The rub comes when a project requires the use of a certain uP, and the uP chosen by (or forced upon!) the designer lacks the right peripherals. Then there are manufacturers who just make sophisticated peripherals that won't directly interface with anyone's uP -- such parts are called "universal".

It happens that, within TAPR, the majority of the group have a soft spot for the Motorola architecture, and some clever people at Commodore made up a uP that is bus-compatible (that means that the hardware interfaces the same) with the Motorola fimily (6800,6802,6809) and the uP they made, called a 6502, is very popular. Every Apple, PET, Atari, AIM, KIM and SYM has one. So does the TAPR TNC.

The 6502 family incorporates some powerful peripheral chips, such as the 6551 UART (with baud-rate generator) and the 6522 Parallel Interface (with dual 16-bit timer/counters), both of which are on the TAPR TNC. The family does not include a good HDLC controller (good means on-board PLL for clock recovery from NRZI data as used by nearly every packet group).

Meanwhile, on the other side of the uP architecture, Intel and others have their own families, and were responsible for pushing through a memory standard endorsed by JEDEC (which doesn't necessarily mean much), and many manufacturers have jumped on this bandwagon. The concept is called "bytewide", and it makes for a universal socket that can take ROM, EPROM, EEPROM and RAM. It uses a "two-line" control, which is nice for them and bad for the Motorola types. (Heh,heh -- very clever.)

Another outfit, called Western Disital, makes smart peripherals for doing things like HDLC control. Rather than take sides, they use an Intel-like control structure, but invert all the lines so the HDLC chip will need TTL "glue" with everybody's uP. Then they undercut the market with pricing so designers can buy some TTL and still save money!

With this background, the TAPR Hardware group appeased the majority by using the 6502 (in all fairness, a good chip, and one that has a lot of software development behind it within the TAPR infrastructure), the bytewide memory standard and the Western Digital HDLC controller.(For those who may be concerned about the compatibility of the WD 1933 chip with the 8273 used on the Vancouver TNC, let me point out that the KA6M repeater in San Fransisco uses the 1933 chip.) As it turns out, the TTL glue needed to tie all of this together, including the clock generator, comes out to four packages, plus a Shottky PROM used for address decoding to allow any mix of RAM/ROM sizes in the bytewide memory area. Alpha TNC's are set for 2 2k-by-8 RAM's and 4 4k-by-8 EPROMS, but the sockets can handle up to 8k-by-8 parts, and the address decoder can be changed very,very easily.

The net result is a TNC that is easily reprogrammable (in a high-level language called FORTH - but that is another issue), capable of using the latest technology in memory components for future expansion and very economically priced due to the use of multiply-sourced parts.

Next month we'll try to highlight some of the hardware-oriented goals of Beta test, as well as report on Alpha progress.

Meanwhile, if you happen to be in Southern California during the weekend of June 4-6, be sure and come to the ARRL Southwestern Division Convention and San Diego Computer Fair -- TAPR will be there in force, with operating TNC's. Saturday mornins will include a full session on packet radio, with participants from all over. We're looking forward to a great time, and hope to convert many an ASCII/RTTY buff to packet. Hope to see YOU there!

73's from the TAPR Hardware gang
Lyle Johnson, WA7GXD

TAPR Protocol Report

Last month's AMRAD newsletter included comments and comparisons of Terry Fox's protocol proposal and the TAPR protocol. The TAPR effort has been modified heavily since the last (December) release, and now complies very nicely with "standard" protocol and interface definitions. Take a look at my article in this newsletter on protocol for more information on what TAPR will be doing.

And So On

Mike Parker and the Microwave Committee have performed initial tests on the type of transverters that AMSAT plans to use to access the L-band transponder input [illegible] phase IIIB, using an

AMSAT-supplied box sent down here a couple of weeks ago. Preliminary design should be completed before the next newsletter. Volunteers for Beta testing are still being sought.. we currently have fifteen major cities lined up, with more due, but the first Beta distribution will be pretty much settled before next month.

Stay tuned for more reports on local and national activities of the TAPR group!

73, Den KD2S

PROTOCOL EXPOSED !
(or "Why I Don't Talk to Myself")

By Den Connors KD2S
Tucson Amateur Packet Radio

I don't normally talk to myself, but if I do I never listen anyway. At least normally. But after several weeks of very heavy labor both at work and for TAPR, I found myself discussing things in my brain.

"Self," I said,"I'm really proud of how well the different groups involved in packet radio have done to date. Did you notice that We're all using standard protocols?"

"Excuse me, but I'd like to see how I came to decision!"

"What do you, I mean me, mean by that? The VADCG group has chosen HDLC, and AMRAD is working on an ADCCP package. Even TAPR is looking at a subset of the IEEE-802 LLC (logical link control)."

"Look again... How often do you guys read those standards? The first two bit-oriented protocols were never designed for local area network use. They were meant for a primary point to link to one or more secondary points, on a dedicated line. Which groups send a continuous stream of frame flags or "breaks" down the line when the primary's not transmitting?"

"Well that's just a stupid thing to do on a radio channel. Of course none of us block the channel!"

"Yet you'll find that in the HDLC standard. Never mind. Answer this then: All of the protocols involved presume the address of the primary, and so ALL addresses are that of the secondary, receiving station. I don't recall that the above-mentioned groups are placing the receiving station ID in their packet address space at all."

"Well, that's true. The ID used is always that of the sending station instead."

"That's right. So none of you hams are using some fundamental aspects of these protocols. It's a good thing too."

"Why do you say that?"

"You guys are misusing these protocols to let you get onto the radio channel with packets. You change the standard around to reflect the fact that there's a repeater on channel who will be instrumental in routing the packets, based on initialization schemes using the control field. The medium is not one of a primary in control of slaved secondary stations. It's one of multiple primaries, or nodes, all with the power to initiate conversations at will."

"OK, so we don't run HDLC, or ADCCP or whatever. But notice that I said TAPR is using a subset of LLC, a brand new protocol DESIGNED for local area networking! I think we have the jump on all the other groups!"

"Think again Charlie. What you guys will be using is a dynamically-assigned, single byte addressing scheme with both the sender and receiver ID in the packet header. That allows a balanced mode of operation, but ADCCP and a few other protocols allow balanced modes without double addressing anyway. Your problem is that the IEEE standard also calls for a "medium access layer" sitting smack dab between the physical and link layers, and that layer is more complicated than anything any of the ham groups have come up with yet! I think you'll find that using a protocol designed for a 10Mb/s link would be just as bad as using one for point-to-point. All groups are justified in using whatever "sub-set" of whatever protocol they want, since there is no standard designed for slow packet radio channels!"

"Sigh.. I guess we're not at the point yet of defining a universal standard for balanced-mode transmissions on a shared medium that doesn't lend itself to simultaneous collision detection, true?"

"I'm glad you said that... Sounds like you hams have a lot of work ahead of you in figuring out what will work best. Keep up with protocols BASED-ON, but not compatible with, the standards already out, and the controller chips will help you out financially. The IEEE will have some standards for broadband coaxial cable networks in the near future, and the head-end translator looks a lot like a repeater.... Keep up the experimentation..."

"OK. Now can I go to sleep?"

TAPR PROTOCOL

The Tucson Amateur Packet Radio group will be using a protocol based on standard segmentation of networking tasks into levels of protocols with well-defined interfaces between levels.

PHYSICAL LEVEL

The physical medium includes medium access pro-

ceedures, specifically using carrier-sensed multiple access on a channel which may have, but does not require, a simplex digital repeater. The two tones used by the Bell 202 standards will be used for mark and space, and NRZI encoding will provide for synchronization of the incoming packet to the demodulator.

LINK LEVEL

The data link layer operates on the physical channel, controlling access and utilization. Specifically, the link layer handles:

control of data transfer
error checking and recovery
information coding
information transparency
optimization of channel utilization
maintenance of synchronization
communication facility transparency
remote node bootstrapping capability

A "sub-set" of the IEEE-802 Local Area Network Standard is used, a combination of the Logical Link Control and Medium Access Control. Medium Access (MAC) fits within the LLC packet, and may be used to handle a large number of medium specific problems which simply cannot be handled by the point-to-point and multi-drop bit-oriented protocols currently in use. Multiple control stations, nodes located in multiple local area network domains and other problems of this ilk can be controlled by expanding header bytes beyond the control byte.

The control patterns used in the control byte are defined by LLC, and are identical to those of HDLC, SDLC, ADCCP and others. There are two address bytes, those of the sender and receiver, allowing non-repeater and repeater operation. The addresses are given to nodes at the time the node enters the net by the first station on the channel. This station, designated the Net Control or Station Node, is identical to all other nodes on frequency, except that it parcels out addresses for nodes checking in, and distributes to all nodes current addressing information. By default then, any stations leaving a net immediately lose their ID, and are given a new ID upon arriving at any new network. If no net exists on frequency, that node becomes the net control. No multiple address problems are possible in this type of addressing scheme; if a system failure occurs, however, the net control simply reassigns ID's to violating nodes. Note also that all information for giving out ID's is available at all nodes, so that the loss of the net control is handled trivially by the first station detecting loss picking up the NCS .

NETWORK LEVEL

The current network layer must handle the functions normally associated with control of the local area channel, transport of messages and interfacing applications programs for these early networking experiments. Specific functions handled by this layer are:

support of datagrams and virtual circuits
opening and closing connections
data transfer
error control
message flow
routing of messages to destinations

The mechanism for flow control is the simple stop-and-go type of algorithm, identical to other packet implementations. Certain of the functions called out are also found in the link-level protocol, since these hooks are required to pass the functions through the channel. There will be more on this protocol written in the TAPR activities column by the Software Group, as "things develop".

Good Mornins Hank:
     Please check the DG as I have tried to reset it...no luck. Also I have been having trouble with the phone line.. as this is about my 4th apttemp to leave a mss. Have a sood day...Hi to Sarah, Nick, and Cindy...best
-cas-

Date: 08 May 1982
From: Hank, KA6M
To: Den Connors, KD2S
CC: W6JHJ, N6ECT, WA6SLF, KA6ETJ, N6FTZ

Den,

The followins individuals are qualified and have expressed interest in becomins involved in testins the TAPR boards:

Bob Reilins, W6JHJ - FORTH expert, 6502 owner, and the second person in this area to transmit on packet.

Curtis Spansler, N6ECT - One of our most active packeteers.

Jeff Sue, WA6SLF - Apple owner and lonstime member of PPRS.

Jim Christol, KA6ETJ - Apple owner and implementor of an excellent interface program connectins the Apple to the VADCG.

Dave Ensle, N6FTZ - Apple owner and protocol expert.

So from 1 to 5 beta boards would be useful, dependins on how many you have available.

73, Hank

TO: HM
FROM: LSK
SENT: 07 MAY 82 18:45:55
READ: 08 MAY 82 00:09:10

Hank, Bill - I will be arriving San Francisco Apprt Noon next Wednesday and leaving late Thursday Evening. (after 11PM).

I would like to get together with you chaps in the PM on Wed or Thur from 6 to 10 PM or so. I will be staying at the Sheraton Sunnyvale and will have a good FM 2 Metre rig with me and a car. What can we put together??????

Larry, VE3QB/WA3ZIA

P.S. I still have the Drake 2 meter radio with packet xtals, if there is a need for another radio...-cas-

Hank, I just spoke to Woody, and he reported two things that might be of interest re the connects and use of the repeater. 1). The battery charger will not provide a full charge for the radio battery, unless it is used at "high power" and charges overnight, giving the output a full 15 watts. Upon using the repeater for a (?) period of time the power will then drop back to it's rated 10 watts. If the power drops below 10 watts, the repeater seems to cut out. This would account for the times that I have tried to dump long files, and have the repeater drop. 2). There also seems to be a question about the 202 modem over there as Woody mentioned that when the (?) RS light comes on the repeater also seems to drop out. He also mentioned that at times there is so much noise generated by the (?) repeater, that he has had to "turn it off". Of course, when things are working.....everything is FB. You might want to mention this to Stu. I am sorry to complain, but my phone bill is starting to get more money than my experiments (chuckle), 73, and best as always to you and yours..... -cas-

Hank,

I called you about getting one of the modem boards at the last meeting. Unfortunately, Ron Brown, who was going to pick it up for me couldnt make it to the meeting. I would still like to purchase one if some are still available. I will be out of town for a week but will get in touch with you when I get back. Sorry for any inconvience I caused.

Thanks,
Bill Danielson

Hank, I have reserved the Ampex cafeteria for June 1, 1982. -- David, W6RAW

TO: HM
FROM: DML
SENT: 06 MAY 82 15:11:10
READ: 06 MAY 82 16:06:46

TO: ALL
FROM: DOUG, VE7APU/W2

I AM NOW IN KINGSTON WITH MY COMPUTER. ONE OF THE DISK DRIVES DIDN'T SURVIVE THE TRIP HOWEVER. THE OTHER ONE IS WORKING OK. MY ADDRESS WHILE HERE IS:

HOLIDAY INN,
ROOM 431
503 WASHINGTON AVENUE
KINGSTON, N.Y. 12401

AND THE PHONE NUMBER IS (914) 338-0400

73, DOUG

May 5, 1982

To all packet users:

This is a report of the May 4th Pacific Packet Radio Society meeting. Topics discussed included:

1. The VADCG 1200 baud modem board. Bob Reiling and Stu Neblett showed their assembled units. Bob's is completed but not tested, and Stu's is nearly complete. The bare board is available for $12. Bob estimated the additional parts cost at around $35.

2. The TAPR TNC project. Hank Magnuski relayed a request for people to help in the beta testing of the 6502 based TAPR board. The software is being developed in Forth. Several members of PPRS offered their help.

3. Protocol addressing. The days of a one-byte hard coded packet addressing scheme appear to be numbered. The question is what should replace it. Hank discussed several possibilities which have been detailed in previous "QST" messages.

4. Free modems. Dave Allen obtained a number of 202 compatible modem modules which were cosmetic rejects and given to him with the agreement they would not be resold. These compact, power efficient units measuring about 3 X 2 X 1 1/2 inches were all checked out and appear to function perfectly. Although everyone at the meeting got one of these, Dave regrets there are no more left.

5. The guest speaker was Roy Neal from NBC. He revealed for the first time publicly that a VDACG packet repeater was smuggled into the last space shuttle. None of us who were involved in the space/packet project will forget the excitement of working packet stations through the shuttle.

6. Packet radio illegal in U.S. Toward the end of the PPRS meeting, Larry Johnson of the F.C.C. arrived. We discussed the proposed ruling forbidding HDLC packet protocol since the F.C.C. has no way of monitoring it. The commission seems to have its mind made up on this.

7. Next meeting June 1. The group agreed to meet again Tuesday, June 1, at the Ampex cafeteria in Redwood City. Who won't want to find out if there is anything that can be done to save packet radio? (There is no guarantee there will be any more free packet/ham radio gear though!)

Hi Again:

As I was about to leave the system, I noticed that Stu, was still logged in from 23:50:26 as of 04-MAY-82 on con5 (PID: 6). You might want to reset, and oh,,, I forgot to mention that Mojo & I have been having a hard time getting into the DG via packet....that accounts for all the phone traffic.

73, -cas-

Hi Hank & Good Morning!

Sorry that I missed the meeting last night. At the last minute I had to go to work (filming rock'n'roll). If at all possible, I will be in your neighborhood later today, and would like to pick up the VADCG Modem. In case you are not around, would you leave it with Diane or someone down there. I think, or seem to remember that the price was $12.00. CUL,73 Have a Good One -cas-

TO: HM
FROM: DC
SENT: 04 MAY 82 04:46:18
READ: 04 MAY 82 21:03:17

To: Hank
From: Den

I received your message, and have several comments.

Tell me about your busy work schedule! I now am designing the third largest campus-wide local area network (8 to 5), have to take care of an 11 month-old until 9pm, sleep until 11, then typically get up and work on packet ideas until about 3am! Then it's back to sleep for a few hours, until the next day dawns...

Please tell your group that we are truly interested in individuals who want to be involved in testing the hardware and software in the first stage of the effort, then in evaluating different protocols later on. We must have someone who will be willing to keep very close tabs on the status of testing, different protocols before jumping to conclusions.

(Incidentally, Paul and I have decided that X.75 is the only serious answer for the future... Which future is uncertain!) WB2CAM Gordon Beattie is very interested in the X.75 standard, and although I heartily concur with your personal feelings, I will feel positively righteous pointing to actual on-the-air experiments with all-too-conclusive results!

I would like to help your decisions to go to San Diego. Rosemary and Chris will be with me, and could be of great value in a mutual baby-sitting effort if you wanted to try bringing the whole family.

I will send you a copy of the latest hardware manual, and of the general Beta test announcement and recruitment poster, as soon as we write the latter, later this week.

Enjoy,

Den

W6JHJ
WA6SLF
N6ECT
N6FTZ
KA6ETJ ?

Date: 02 May 1982
From: Jim Christol, KA6ETJ
To: All packet stations

PENINSULA AMATEUR RADIO/COMPUTER ASSOCIATION

Public Demonstration of Computers in Amateur Radio

Saturday May 22, 1982
Foothill Electronics Museum
10:00 A.M. - 2:00 P.M.

The Peninsula Amateur Radio/Computer Association, a group of Radio Amateurs and computer users, will be staging a demonstration of computers in amateur radio. The demonstration will be at the Foothill Electronics Museum.*

The demonstration will include:

1. Slow Scan TV (SSTV)
2. Radio Teletype (RTTY)
3. Packet (digital communication using HDLC framing)

The demonstrations will be done on Apple, Heath and TRS-80 computers.

The Peninsula Amateur Radio/Computer Association meets on the second Monday of the month at the Foothill Electronics Museum. The May meeting will be on the 10th @ 7:30 PM. The speaker will be Dave Hanntula, who is an RFI expert from Apple.

*The EMARC is holding a flea market in the parking lot next to the Museum starting at 9:00 a.m. The flea market usually has a good mix of components, computer related equipment and amateur equipment.

I would like to know which packet stations will be around that day and would be willing to participate in the demo. Please send me a message. Thanks.

73, Jim

TO: HM
FROM: DC
SENT: 03 MAY 82 01:02:43
READ: 03 MAY 82 03:59:51

To: All groups

From: KD2S

On May 2, the TAPR TNC board became aware of itself for the first time. Installed in PROM is a complete FORTH interpreter, capable of communicating with RAM, non-volatile RAM, and the I/O chips.

This move was not planned originally, but was decided on by having the hardware development team (Lyle) trying to bring the primatives up using only assembler. Initial efforts using the new FORTH show Lyle's productivity to increase by about ten-fold! (a very subjective test).

This FORTH will speak to our AIM65 developmental system and a couple of Apples, allowing us to burn PROMs. Our first protocol will be ready this month. VADCG and AMRAD protocols are still due to be released with beta test. Check next month's AMRAD newsletter for revised (read sensible) TAPR protocol.

73, Den

Date: May 1, 1982
From: N6ECT Curtis
To: All Interested Packet Stations
Re: Calls Lossed KA6M** for the month of APRIL

N6ECT	-	48
W6RAW	-	30
AA4KB	-	24
W6JHJ	-	12
WB6SDE	-	11
K6VCO	-	9
WA6JFZ	-	6
N6GJH	-	6
KA6NAN	-	5
WA6RZW	-	5
N6FQR	-	5
WA6SLF	-	5
N6BOH	-	4
KA6ETJ	-	4
N6FTZ	-	4
W6CB	-	3
KD6LI	-	4
WB2CAM	-	3
K6HWJ	-	2
KA6M	-	2
AD7I	-	2
KA2BQE	-	2
KO6R	-	1

109 calls lossed via packet radio
88 calls lossed via telephone

197 total calls lossed into KA6M** for APRIL

73, -cas-

Date: 30 April 82
From: Hank
To: all packet stations

Re: KA6M**

Thanks to the assistance of Stu Neblett, the reports from KA6M** should be better. We retuned the receiver and transmitter, set the deviation (higher), and pointed the antenna towards the repeater. So the link to the repeater should be somewhat more reliable. I would be interested in getting any reports of improved reception.

Those of you working the computer direct may notice a change in signal, for better or worse, depending on where you are.

73, Hank

TO: HM
FROM: DC
SENT: 29 APR 82 07:19:58
READ: 29 APR 82 16:01:18

To: Hank
From: Den

I'm going to have to talk to you over the phone very soon, so advise me if there is a good or bad time.

I would like to coordinate a joint effort between the PPRS and TAPR for a presentation at the SW convention. I'll be in town a few days early (looking over Linkabit's latest offerings in packet radio and satellite codecs), and will be able to make arrangements as required. I'll be speaking to Fried Heyn tomorrow, the SCM for Orange County. I would like to set up demonstrations with you, and present introductory information on PR with booths, talks and the forum. The reports from Dayton were pretty depressing, with the forum apparently not organized well at all. We did present our alpha boards there incidentally.

We are now trying to size up the order to the PC manufacturer for the beta test boards. Pete Rowe will be calling you from your area, and would like to be in the beta test. Could you find someone from among your group who would be willing to spend some time working with owners of TAPR boards in your group? Chuck will be sending fairly complicated inspection and evaluation forms, and Lyle will want the beta site coordinator to put a 2732 PROM burning circuit that he designed into the wire-wrap area. Dave N7AIG is putting a complete, interpreting FORTH in PROM, so that the protocol in the boards may be changed on the spot, allowing a much quicker way of correcting errors and modifying protocol.

We will ship him the beta boards for his area, as well as protocol documentation, listings and PROMs. We will have on the beta board a basic TAPR protocol and VADCG protocol, and will want them tested. Some beta sites will also be involved in higher level protocols; Bob Blanc of the NBS is very interested in our beta testing, which can provide him the service of test sites for the protocols they are "pushing". He is sending us, for dissemination to the beta sites, complete documentation and listings, in both C and Pascal, as well as Pascal pseudocode logic information, the Internet Protocol, two of the five TCP's (#2 and #4), and the session control protocol. We will be in contact with the bureau via regular X.25 connections. Would you like to see any of this code, or would you be interested in beta testing some of this material? To keep the other standard covered, Gordon Beattie WB2CAM and the guys at RATS are going to develop a clean implementation of X.25 and X.75 for the board, which will allow some very good comparisons between their beta site and others.

The coordinator would have these tools for modification, but would also pay the price; we need accurate performance reporting and prompt protocol alterations thoughout the user group. The large number of VADCG boards running the non-station-to-station protocol makes San Francisco by far the most ideal beta test for TAPR boards operating in the presence of a VADCG network, and I would like people who really understand the protocol to check on the code Margaret and I are writing

I look forward to seeing you in several weeks. Talk to you soon.

73,
den

TO: HM
FROM: DC
SENT: 28 APR 82 06:43:20
READ: 28 APR 82 23:22:06

To: Paul
From: Den

Please send all mail in the future to :

Tucson Amateur Packet Radio
P.O. Box 22888
Tucson, AZ 85734

Send checks c/o Treasurer, TAPR, and send general information to me.

Please change the TAPR column header to reflect this new address.

I will be strongly urging Chuck not to take up Terry's challenge to continue the "battle of the protocols". I think any attempt by any of us to malign the efforts of any AMRAD group can only serve to weaken AMRAD's image. Please try to convince Terry in the future to treat TAPR's efforts as the same type of experimentation that AMRAD is doing, and that only through such multiple efforts can the best protocols be discovered for varying systems. We will respond to his current misunderstandings with descriptions of protocols in the monthly column, and in othe articles.

I am writing an article for the newsletter, not to be included in the monthly column, which describes the packet radio environment, and will attempt to compare how different protocols will handle real-life situations.

73, Den

TO: HM
FROM: DC
SENT: 28 APR 82 09:25:11
READ: 28 APR 82 23:23:09

to: AMICON Standards Committee
from: Den Connors KD2S
c/o Tuscon Amateur Packet Radio
P.O. Box 22888
Tucson, AZ 85734
(602)-744-9306

Please take a look at this draft, and sive comments to Hank or me....

Amicon Interim System Specification for the AMSAT Phase III Satellite Channel L1

This document is meant to be used as an adjunct to the AMICON SYSTEM SPECIFICATION. The applicability of these interim standards shall be for a period to be detrmined by the Amicon Coordinator. Any part or all of this interim standard shall be subject to revision or elimination as the system matures. Refer to the main document for additional information on each interface level.

LEVEL 1 INTERFACE: PHYSICAL INTERFACE

1.1 Channel Assisnment and Characteristics

An attempt shall be made by system nodes to keep the frequency of the unmodulated carrier as close as possible to 11.25kHz above the received frequency of the seneral beacon, measured locally.

1.2 (not applicable)

1.3 Carrier and Modulation Specifications

Access to the Amicon channel shall be by appropriate transmittins/receivins equipment, with a desisn capable of providins a sisnal-to-noise ratio on reception by the satellite of about 20dB or better.

Audio Frequency Shift Keyins (AFSK) shall be used to modulate the transmitter. Input to the modulator shall consist of a steady 1200Hz tone to indicate a mark condition, and 2200Hz for space (Bell 202 tones). Total bandwidth of the modulated RF sisnal shall be restricted to 15kHz, within which will be contained all sisnals with levels in excess of 20dB below the carrier level. [This modulation technique is compatible with all currently available amateur packet modems. A separate effort will be pursued, usins the mode X transponder to experiment with advanced modulation techniques for introduction into the Amicon Standard.]

1.4 (not applicable)

1.5 Data Terminal Equipments

No attempt will be made by this document to standardize on the mechanism of interfacins the user data equipment to the system nodes.[It

is assumed that the terminal node controllers beins used will be interfaced either with an RS-232-C serial port, or some custom parallel interface.]

LEVEL 2 INTERFACE: PACKET TRANSMISSION SPECIFICATIONS

2.1 Packet Framins Specifications

No attempt will be made by this document to standardize on the mechanisms required for station nodes in attached local area networks to access the Amicon access nodes; rather, only the Amicon node (sateway) protocol will be specified, as described below.

High-level Data Link Control protocol (HDLC) will be used to control the multiple access channel.

2.2 Transmission Code

No attempt will be made by this document to specify the type of transmission code to be used within the packet.[The lack of standard specifically allows both ASCII transmission and binary file transfers; the latter will be very useful durins experimental phases, for transferrins program files containins the latest Amicon network updates.]

2.3 Channel Multiple Access Protocol

Access to the channel shall be by non-carrier-sensed multiple access (ALOHA) and carrier-sensed multiple access.[The latter standard allows use of sensins satellite transponder output durins transmission of blocks of (identified) multiple packets, which will have transmission times sreatly in excess of round-trip travel times.]

2.4 Addressins Scheme

Each Amicon node will be assisned a sinsle-byte unique binary identifier. Addresses will be obtained from the Amicon Coordinator at some time before a sateway comes on-line.[There are several current and planned addressins schemes for local area networks. However, the very small number and immobility of the interim network nodes allows this extremely simple and efficient mode of addressins.]

LEVEL 3 INTERFACE: NETWORK SPECIFICATIONS

3.1 - 3.4 (not applicable)

No attempt shall be made by this document to standardize the mechanisms for controllins the hisher network functions of the Amicon network.[There are several schemes to attempt durins the experimental period: the network level (3A) protocol may be performed with datasram or virtual circuit techniques, and the internetwork protocol (3B) has parameters which should be investisated before standardizins. For the latter protocol, the NBS Internet Protocol has been preferred by all active sroups, and AMRAD has devised a sood addresins scheme to fit within the standard's boundaries.]

LEVEL 4 INTERFACE: TRANSPORT LEVEL PROTOCOL

No attempt shall be made by this standard to specify any hisher-level network layers of the Amicon network.[The NBS is currently workins on hisher-level protocols for networks, and has five Transmission Control

Protocol (TCP) standards, of which the #2 protocol is probably most appropriate. The Bureau is aware of our current activities, and will be sending complete documentation and coding (listings and machine-readable code written in C and PASCAL) to assist in AMSAT's Amicon experiment. Copies of Internet Protocol (IP), TCP, and session control protocols are being delivered.]

73, Den

Hi Hank,

Thank you for your answer concernins settins backspace from the Data General. I tried the "VT52" switch, but that didn't work for me. here is what I sot:

```
) vt52
) this is three deletes   D DD DD D
) this is a control-U  CCK
```

The uparrow means that the next character is a control character. So, I'm not sure if the problem is in settins the device confisuration correctly on the Data General, or if somethins funny is soins on with Unix at my end.

```
What is the "VT52" command actual) vt52
) this is three deletes   ^]D ^]D^]D ^]D^]D ^]D
) this is a control-U  ^]C^]C^]K
```

Hi Hank,

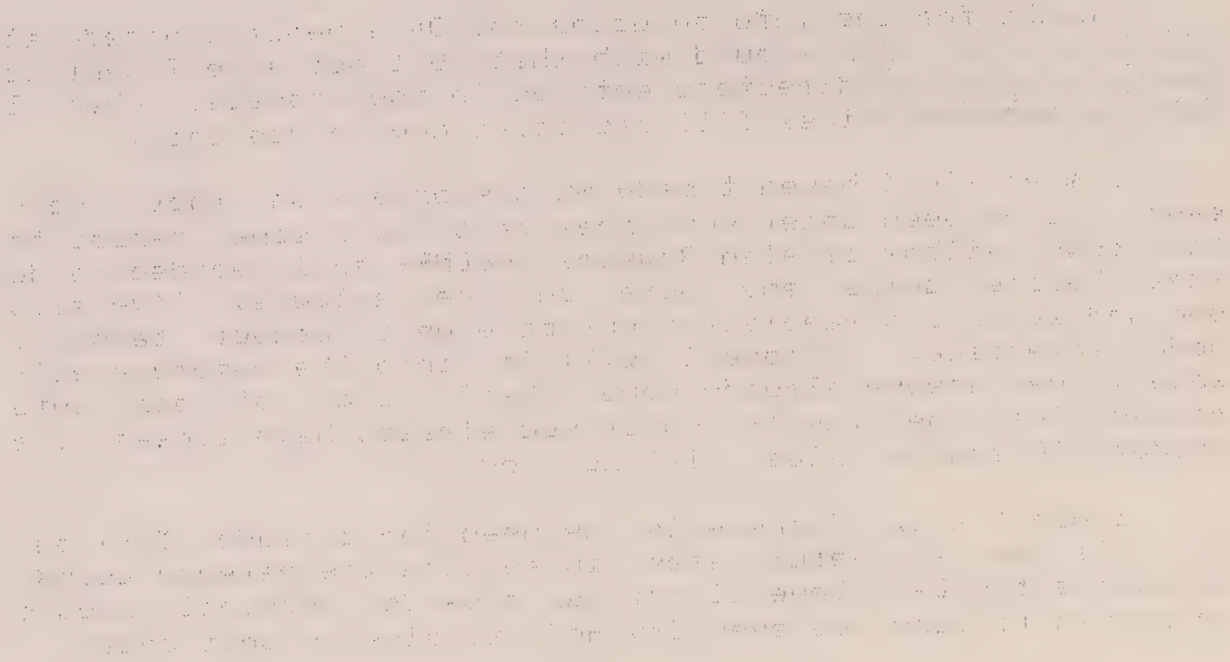
Is there a way to have the DG send out control-H when a delete is sent? I've played around with "characteristics" and I can't seem to find a way. Since 99% of ascii terminals use a control-H for backspace, I find it really strange that the various configurations I've tried do not send it out. I can live with sending a delete in place of a real backspace, but I need one echoed back for the crt at work to look right.

-- David, W6RAW

Thanks for the info on using the Data General broadcast utility. I'd play around with that, but not sure I want to create a bunch of directory entries in the process. When I get the gateway going, I'll broadcast how to use that.

I'm afraid I haven't made much progress on that, however. I've been under some presure to make some changes to the K6GWE mailbox by Alan Bowker, WA6DNR, so I decided to do that before doing any more on the gateway. I've also decided as an intermediate step, make up a baudot terminal mode interface. (I hope it will fit into the memory available.) Has anyone already done that? I'm not big into reinventing the wheel, so if you already have access to a baudot TIP source, please let me know.

I don't know if there is any need for a baudot TIP, but it will be a useful step in getting the gateway going. Accessing the Data General through a baudot terminal should be enough to convince even Irv Hoff to give up that code.



Hi Hank. Congratulations on Release 2.0! Read note from K2DS.
I like the idea, since I think that in our rather inefficient network more
overhead is that REPE
REPEAT:overhead is the last thing we need. KA6M/R seems to be up
most of the time, and we could always have other stations do it if /R went
down. However, I wonder how that would fit in with a network where we have
multiple repeater hops. Would one have to log into each repeater? That
might be a pain... Just a few comments, probably having no bearing on
anything... I do that sometimes... By the way, do you know of a way
of putting together a cheap (read $25 or less, preferably!) EPROM eraser?
I am in reasonably desperate need... found out my Bytesaver board worked
last night... that really surprised me since I got it at the Swap Meet for
$50 and expected to have to repair it. Good deal there...
Keep in touch... Rick N6GJH
P.S. Do you remember what command I use to go into (I think it was
VT52 mode? Drop me a note... TNX

TO: HM
FROM: DC
SENT: 25 APR 82 10:42:12
READ: 25 APR 82 17:29:32

To: all members
From: Den
Re: dynamic addressing

Recent comments by Paul and Terry in their suggestions for an interim AMICON standard have shown me that I have been lax in properly describing the "dynamic addressing" system. Here are some specific comments on comments!

System Definition

dynamic address server node ("net control")... That station which is assigned the task of assigning to each node signing on, a unique, one-byte address, for the purposes of transferring data with maximum efficiency. This node shall keep a list of active nodes on the channel, and transfer or update that list as required to keep all nodes informed as to valid net members. In the event of address server failure, the node detecting such a failure will immediately assume the role of server, and perform the necessary functions to insure accuracy of server list information.

NOTE:

1) ALL members of the network have the ability to be "net control", and replacement of an address server node is fully automatic, as well as dynamically reassignable by consenting nodes.

2) There is no NET CONTROL. The only service performed by an address server is the assignment of addresses and distribution of lists of active nodes.

3) First one on the frequency is automatically the address server; in the case of two stations going to another simplex frequency, there is an automatic assignment of server and "servee" by this mechanism, so that no digipeater is required.

4) That lack of a need for a digipeater, while not unique to this protocol, does allow as robust a system as possible..if just the sending and receiving nodes survive a network trauma, the above mechanisms guarantee connectivity.

5) Dynamic Addressing requires no fixed addreses. This avoids the problem of more users than ID's, even though few users are on channel at any given time, and of "mobile users" entering new networks; this solution is more efficient than the alternative of having much longer addresses, decreasing the thrushput of the network on every packet transfer by 4% to 40% per packet, depending on packet length (assuming a six-byte full call-sign address).

6) The protocol supports multiple ID's per packet. You may specify a node by its individual address, by some common group ID, by class of service it can provide, and (by default) as a member of the global network for true broadcast capability.

Now to the response to comments:

"...need check into an NCS to connect..." - Connecting any stations

together requires some form of handshaking. This protocol, for the overhead of control packets at sign-on, will prevent much traffic that would go to stations which will not happen to be on-the-air at the time of connection attempt. Remember, there is no "Network Controler", just a friendly station who wants to help new stations determine who's on channel.

"the ability to communicate after the loss of a net controller..." - see 4) above.

" satellite's footprint complicates both addressing and handoff.." - Both addressing and re-addressing (handing off) are fully automatic, and the ground links will have access to all information as to location of a node at any instant with a single query to address servers connected to links either intesrally or via the local channel. No global directories are required at a central site for a satellite inter-networking facility to operate.

" at HF, the propagation..question the feasibility of net controlling at all.." - Once again, there is no Net Control. After receiving an address from some station, higher-level protocol within the node would be free to keep that address after propagation takes its toll on the paths involved. Note that this is a perversion caused by trying to use a local area network protocol in an extended network environment. It might be prudent to look at the entire problem before trying to fit existing answers.

My final comment is on the statement in the Internet Sublayer description, "..that would contribute to additional overhead which is universally frowned upon". - In designing the most efficient system without considering the level of throughput required, many simpler schemes which are not as efficient as more sophisticated (read "complex") techniques are thrown away. These alternatives should always be considered. Also an indirect impact of a piece of a protocol on total throughput of the channel is possible, by requiring more complicated mechanisms to use the "simple" service. Therefore proving a part of a protocol more efficient (e.g. "dynamic" vs "static call-sign" packet efficiency) does not guarantee the best solution. Always feel free to use multiple solutions to the same problem at different sites, with commonality guaranteed at the gateways. Why should we be different from the vendors of local area nets? (They're still experimenting too!)

73, Den KD2S

TO: HM
FROM: WWP
SENT: 23 APR 82 17:46:01
READ: 23 APR 82 17:57:13

To: All
Fm: Bill Putney, WB6RFW

Does any one know where I can get Motorola MHW710 or MHW720 UHF power amps (or EQU) for less than list? I'm trying to get a link running and need more than the 250 mw I have. I'm also looking into a link for the SF packet machine to a packet machine further south and will need a couple for that project.

73's Bill

Hank,

First of all, congratulations on the new release! Glad to hear that everyone is doing well.

Next, wow! that was some meaty mail that you distributed yesterday. It makes it appear as if people are actually *doing* things! (I know, I still haven't done any work with the Internet headers).

And finally, I had a pretty fair turnout on Hamnet last Sunday evening for a "tutorial" conference on packet radio. I transcribed the conference to a disk file on my CP/M system and have an edited version that I will upload to the DG if you like. I believe we will have more in the future, as long as my typing fingers hold out.

73, MoJo

Hi Hank,
    I transferred lib.asm to Unix here at work, and the file looks fine, as you claimed. I did transfer it twice via packet, however, and got the same garble in the same place each time. So, guess I will have to check into my transfer program at home.

    I would still like to have the info on using "QST" messages, and linking them to multiple directory entries.

------ David, W6RAW

TO: HM
FROM: DC
SENT: 21 APR 82 07:46:39
READ: 21 APR 82 16:37:47

To: Hank
From: Den
Re: AMICON interim standard

Here are sussestions for the interim standard:

1) physical protocol

a) medium- Let's use our 15KHz unwisely for the time beins, and keep an AFSK standard until better modems can be produced. We are committed to buildins the AMSAT 23cm linear amplifier, and should use the available 600KHz disital channel up there for low- and hish- speed experiments. We are contactins other Universities who are experimentins with codins and modulation schemes, lookins for the best, easiest system.

b) connection- RS-232-C is standard; also, let personal computer owners use their TNC's throush whatever (parallel) scheme their TNC allows-- it matters not to the AMICON net.

2) Link Level-

a) Present and future VADCG and TAPR boards will be usins HDLC; let's stick with it.

b) addressins- The present TAPR board and future VADCG boards will be usins dynamic addressins, which presents no fundamental problems. The "net control" or "station node" is a very simple function which may be handled by the linkins TNC. The amateur call sisn is wasteful of byte-space in systems with fast turn-around times, while a sinsle byte is all that is required for unique addressins at the local area net level. Checkins into the net controller is identical to checkins into the link, since they can be the same device (not required, but easy to implement). The loss of the network controller is then the loss of the link, and vice-versa, so that there is only one central point of failure, identical to the case of havins no net control. The place for the amateur call sisn is at the network level, so there will be no need for the transmittins station to know the binary address of the receivins station-- no bulky, slobal routins tables are required.

It is unfortunate that the orisinal VADCG boards used the temporary expediency of assisnins unique addresses to each board while the sroup was waitins for the station to station protocol to be completed. This has led to a de facto standard which will require chansins all PROMS out in the field when VADCG completes their protocol. The concept of multiple ID's, common in most commercially available LAN's, has momentarily been lost to amateur radio, and with that loss soes several simple sub-net and server access schemes.

In the opinion of most of the network TNC hardware desisners, the link level is not the place for a lons amateur radio call, or complicated control and routins mechanisms. This level should just handle data linkins in as efficient a way as possible. We believe the dynamically alterable net control station, sivins out dynamic addresses, to be the most robust mechanism for survivins network node failures, allowins easy routins throush multiple, unique binary ID's existins concurrently. Althoush the link station always may become the NCS, reliability is only suaranteed with multiply available links, a point to remember when allowins only one AMICON link per city.

3) network level

a) network sublayer- X.25 is an acceptable standard, but experimentation at this level will not impact operation of AMICON. Both VADCG and TAPR are going to experiment at this level.

b) internet level- NBS internet protocol would probably be the most likely candidate for mutual mappings of dissimilar network sublayer protocols. For the interim standard (determining how to make our TNC's talk on the channel) however, I would suggest using naked network sublayer. The TAPR TNC will be able to talk VADCG protocol without modification, and VADCG boards appearing in a TAPR net cause the NCS to go into VADCG digipeater mode automatically. The only problem is to use the least common denominator for digipeater protocol... the VADCG system will probably have smarter digipeaters at all LAN sites at about the same time that We're ready to switch over to the full I.P. on AMICON, so I don't think we have to worry about trying to make the various nets talk the same network sublayer protocol in the future.

I suggest we incorporate I.P. as soon as the main LAN sites are ready, and certainly within one year of launch. Pauls suggetions on addressing schemes are very good, and fit within the I.P. standard. I will continue to discuss I.P. with Bob Blanc at NBS, and with the fellows at SRI who are trying to make the required software fit microprocessors.

Please note that Paul and I basically disagree only on the need for dynamic versus static addressing at the data link level, and that this does not impact the AMICON operation in any way, since the hardware systems currently out are mutually compatible, until dissimilar schemes are created. This is an important experiment, which I look forward to, as a member of AMRAD.

It might be best for AMICON to continue the policy of allowing LAN's to use whatever techniques best fit the experimenters' desires, and standardize at the levels of impact only-- the physical and network layers.

73, Den KD2S

TO: HM
FROM: PLR
SENT: 21 APR 82 05:18:25
READ: 21 APR 82 06:22:03

Dear Hank,

In re: AMICON Interim Standard

This represents AMRAD's thinking toward the AMICON interim standard that you are now drafting. It also gives you our thoughts on local area and backbone networking issues.

Communications Channel

We have no problems with the ideas expressed on the telecon. Virtually everyone who is active on packet radio today is using the VADCG TNC, Bell 202 modems to afsk a vhf-fm transceiver with 5-kHz deviation and about 15-kHz rf bandwidth. Unless we stick with these parameters for the communications channel, the packet people will be hard-pressed to reconfigure by the time that Oscar Phase III-B is launched. It is a bit wasteful of bandwidth (as opposed to fsk), but that is a trade-off to allow people to use their present equipment.

Physical Level

There do not appear to be any issues at this level. Everyone in North America is using RS-232-C, and others may use X.21.

Link Level

The link level protocol, in our view, is essentially noncontroversial, at least to the extent that there appears to be a consensus for using HDLC. The main issue here is addressing. There may be some issues concerning the control field, but these are secondary and can be deferred for now.

Dynamic vs. Static Link-Level Addressing

We are fundamentally opposed to dynamic addressing at the link level. One of the strongest reasons is that each individual amateur packet radio station should be able to come on the air at link level and use his TNC board to connect without having to check into a particular network controller to find out his address. He already has one (his call sign), and we see no reason to avoid using it for link-level addressing. This permits an anarchistic mode of communications, and permits operation whether or not there is a network controller present. The ability to communicate after loss of a network controller is vital to emergency communications. It may be key to our being able to stay on the air after a nuclear attack. (Right now, that's against the law. The case is being made now to the DoD that Amateur Radio can survive and that the law should be changed to permit post-attack operation. If the packet net is designed to survive, we have some chance of getting some DoD funding. In our view, the prospects of DoD funding are not at all certain and should not be the driving force.)

The details of our argument for static call sign link-level

addressing and against dynamic addressing are spelled out in Terry Fox's article, "Level 2 Protocol Proposal," which appeared in the AMRAD Newsletter for March 1982. This article had only terrestrial packet networking in mind. There are even stronger arguments for static link-level addressing for satellite and hf links. The satellite's moving footprint complicates both addressing (if done dynamically) and handoff from one net-control station to another (there dynamic addressing would be just one more part of the complexity). At hf, the propagation medium is changing so rapidly as to seriously question the feasibility of net controlling at all (it would be further aggravated by dynamic addressing). These problems are eliminated by static call sign addressing at the link level.

The call sign approach will allow a user to move around several networks freely without having to worry about addresses each time. Even if he moves from a local 2-meter network to an hf link with a buddy three thousand miles away, the address won't change.

There are two important things that should be added to the March article. One is how the "request-to-repeat" and "repeated" bits fit in. The other is that we are no longer thinking only in terms of having only the call sign of the transmitting station in the HDLC address field -- it changes according to circumstances, talked about below.

In this address scheme, the letters of the amateur call in the address field are forced into upper case, which uses 6 bits per character. If we assign the request-to-repeat bit to the first octet of the address, and the has been repeated bit to the second octet, there is more than enough room. This would also allow us up to 5 other bits (one spare bit per octet) for future expansion.

While at first, we were considering using only the call sign of the sending station (not necessarily the source, as in the case of relaying). We heard arguments which said that we should use the call sign of the intended receiving station. That argument ran like this: If you are transmitting on a frequency which has repeaters to the West, North and East, all repeaters may repeat the packet if the sending station's call is sent. This could be eliminated by substituting the call sign of the intended receiving station (repeater in this case). Terry has been working on a more complex scheme which sometimes uses the call of the sender and the receiver, according to whether balanced or unbalanced modes are being used. More on this in the near future.

In the opinion of most network designers, the link level is not the place for other functions, such as device selection within each user, multi-user hookups, or how to route the data thru the system. It has enough to do just maintaining the data link reliably between two points. The above functions are for the higher layers. Therefore, we recommend that we use a version of HDLC called ADCCP. This is very similar to what we are using on the air in most of the country with the VADCG TNC board.

Hf is probably a special case. We would like to use HDLC to the extent possible. [illegible], link reliability would be poor. We need a combination of ARQ and FEC (forward error control)

protocol. We envisage a special board (similar to the TNC) for hf packet links. This subject will be developed later. Clues to our thinking are in the hf standards section of Paul Rinaldo's paper in Volume 1 of the proceedings of the ARRL Amateur Radio Computer Networking Conference, October 1981 and in AMRAD VuGraphs 82-31, "Proposed Packet HF Channels," and 82-32, "Rx for HF Packets."

Network Level

The network layer has often been divided into two sublayers, called the "network" sublayer, and the "internet" sublayer. The first is responsible for maintaining control over a group of links, while the internet layer is used to send data back and forth between these individual networks.

Network Sublayer

The network sublayer (called by NBS layer 3A) is responsible for maintaining the individual link connections from the link layer, and it is also responsible for routing the data from the sender to the proper receiver(s). Since there can be several link level connections going on at once, there is the potential of overloading the network with data. A system similar to level 2's flow control is used at the network level to make sure the network doesn't get overloaded.

The network layer is also where group connections can be made.

After a lot of research, and talking to several people in the networking field, we recommend that the amateur packet community use the X.25 virtual circuit standard at the netork sublayer of layer 3. Usually the individual networks will be reliable enough to support a virtual circuit system, such as X.25. We do not envisage use of the datagram provision of X.25; no one else is using it either. (X.75 would apply to the AMICON. For hf, we feel it unlikely that a network sublayer protocol is either needed or practical. This will be left to separate study.)

Again, we recommend static addresses. The X.25 format calls for 14 quartets (semi-octets), BCD encoded with A-F not used in the current version of X.25. That forces us to encode call signs in their decimal equivalents; i.e., 2 decimal digits per letter in the call sign. (This is something that could change in X.25, opening up a future possibility of something a bit more elegant here.)

Internet Sublayer

The internet sublayer (called layer 3B) is used to connect the individual networks together so data from an individual on one network can be sent to someone else on a different network. This layer is NOT used instead of the network layer, but rather in addition to the network layer. It creates its own headers, and has separate information from the network sublayer.

We recommend use of the NBS Internet Protocol. We do this while realizing that the NBS IP is subject to change on its way to become an ISO standard.

Again, we recommend that static call sign addressing be used at the Internet level. Unfortunately, the format has to be different from those used at the link and network levels.

The call sign is good in one respect - it's unique. It's poor in another - it doesn't designate the location. So, just the call sign would identify the entity but not where it can be found. A look-up table would be theoretically possible, but it's not practical to have every network node keep a table of every ham in the world, where he is, and how to route to him. In fact, most everything in print says that imbedding the routing in the address is a mistake - it ties that location to a given routing unless alternative routing schemes are devised.

So, a good address would include two elements:

(1) who (unique to the host ham station), and

(2) where (unique designation to the area).

That's crowding things to get both of these things into the NBS Internet address field, but it can be done.

The NBS Internet address field consists of 64 bits overall. These 64 bits are subdivided as follows:

The first 16 bits comprise the Digital Network Identification Code (DNIC), further broken down as follows:

4 bits: Zone (continent or ocean)

8 bits: Country (each country has one or more country numbers - the U.S. has 3 now)

4 bits: Network (assigned by the country authority - the FCC in the U.S.)

These 16 bits are organized into BCD quartets, corresponding to the digits 0-9; A-F are not used. The rules for the above DNIC scheme are governed by CCITT X.121.

The remaining 48 bits are terminal addresses and are to be assigned by the specific network.

Assuming that we want to be compatible with the NBS Internet Protocol and its address structure, we could go to the FCC and ask for the assignment of a DNIC for the worldwide Amateur Radio packet network. That would be one international DNIC for hams. The alternative would be to have each Radio Relay League go to their respective telecommunications authorities and get one for each country's Amateur Radio service. That alternative doesn't make a lot of sense in that it can be expected that some countries will assign a DNIC, but most will not.

In any event, the DNIC is assigned by higher authority. We (as a network) need only concern ourselves with how to allocate the last 48 bits.

The call sign, as a unique identifier for a host ham station, would be worth considering as something to put in the

48-bit address field. If one organizes it into octets, it would take 6 octets for the call sign. That would take up all 48 bits just for the call sign. This is not acceptable because we also need to encode location as well as call sign.

Is it the thing to do to extent the 48 bits to whatever is needed for the call sign and whatever else is required? We don't think so, because we've violated the NBS Internet Protocol and done so without much justification. Also, that would contribute to additional overhead which is universally frowned upon.

Can the call sign be made to fit? Yes, thanks to the organization of the ASCII code. Amateur Radio call signs consist of up to 7 characters. The first two characters can be either figures or letters. The third character is always a figure. The suffix of one, two or three characters is always literal. For shorter call signs, the spaces not occupied by a letter or figure are nulled. By knowing in advance the most-significant bits of the ASCII characters used in the call sign, we don't need to transmit them. That permits the following number of bits to be used:

Example call sign:	W	D	4	I	W	G		
Bits required :	6	6	4	5	5	5	=	31

This leaves us (48 - 13 =) 17 bits to play with.

These 17 bits are sufficient to accommodate a 1 degree by 1 degree grid system over the entire earth. 8 bits are needed for north and south latitudes (8 bits provide 256 possibilities, while only 180 are needed). 9 bits are needed for east and west longitudes (9 bits provide 512 possibilities, while only 360 are needed). Stations would use the integer degrees of longitude and latitude, not round off. Those stations above (say) 32 degrees latitude would use only even longitudes. This would make us compatible with the European QTH system, and it would be possible to translate back and forth.

There is much more to talk about. We don't have the time to write more until after Dayton. We haven't discussed the Transport level, which is the level that generates/breaks down the datagrams at the Internet level.

Dave Borden is out of the country for a few weeks, but we went over this prior to his departure. We also had an opportunity, at the Trenton Computer Festival last weekend, to discuss much of this with Steve Robinson but mainly in the context of the East Coast terrestrial network. We think that Steve's thinking and ours are very close and that we can resolve the remaining differences and missivings at our next meeting with him.

73.

Terry Fox, WB4JFI Paul Rinaldo, W4RI

TO: All interested packet stations
FROM: MoJo, AA4KB/6
DATE: 20 April 1982
RE: Digital Phone Patching

For some time now, I have realized that my unique system for packet controlling allows me the option of having a remote terminal controlling my software. The hardware and software for the TRS-80 packet terminal node does not use the available serial port on the TRS-80, making it available for connection to a remote terminal or modem.

This past weekend I demonstrated this capability. Peter Strauss, KO6R, connected to my system as a terminal (my system functioning as host) via 300 baud modem and the switched telephone network. From his terminal he was able issue commands to my software, and conduct a QSO with N6ECT and login to KA6M**.

I'm not sure of what value this demonstration might be to the network as a whole, but it was certainly fun. It may be useful as a means to demonstrate our local network operation to remote stations who are interested in seeing the system work. It's demonstration capabilities are considerably heightened if the distant terminal is able to copy KA6M/R and hear his packets being repeated.

No major modifications were made to my packet software to accomodate the patched terminal I/O, and this created some acknowledgement delays while the software waited to output characters to the slow terminal. This is currently the only difficulty, but only causes a slowing down of long continuous transmissions.

If any of you are interested in arranging a demostration of the network for a friend, please leave me some mail here and I will make arrangements.

MoJo

To those of you who might be interested, see the latest
ARRL Bulletins in file ARRL_BULLETINS.APR.20.
73, Mojo, AA4KB

Dear Hank & Cindy:
Congaradulations on the new baby. I am glad to hear that everything went well. Gee Nick has a baby sister.. I am happy for all of you.

I also want to put in my order for one of the VADCG modem boards.
TYIA
Curtis

Date: 18 April 1982
From: Hank Magnuski
To: All SFO Packet Stations

I now have a supply of VA7CG modem boards (bare, no documentation yet).
Let me know if you want one. Price is $12.00.

73, Hank

The LIPM.ASM file on the DG has about a dozen garbled lines with control characters, etc, about half way through. I need a good copy in order to proceed with the gateway. I'm sure Brian has it, but I've not been able to contact him today.

---- David, W6RAW

Hank,
    Congratulations on the new member of the Masnuski family. There has been progress on the K6GWE gateway, though I'm not exactly completed. I have the GWE mailbox relocated at my house as of this afternoon, and running low power on both rigs, there is no interference between them. So I don't see any RF problems. I did find, however, that my copy of "LIPM.03" was garbled in places, and I'm going to pull it off here now.

---- David, W6RAW

TO: HM
FROM: PRNET DC
SENT: 18 APR 82 04:13:48
READ: 18 APR 82 16:53:06

to: Hank, Mother & new daughter
from: the Tucson Amateur Packet Radio group

Congratulations on newest modulator!
The initial parameters seem impressive, but please fill us in on the operational parameters, specifically:

1) mean throughput of pockets
2) compatibility with release 1.0

Please congratulate the developmental system for us!

73,

Den KD2S
Lyle WA7GXD
Chuck N0ADI
Marc WA7PXW
Dave N7AIG
BAKE
and the TAPR gang...

ALL MESSAGES READ

Date: 17 April 1982
From: Hank Magnuski
To: All packet stations

Re: Release 2.0

I am very pleased to announce that Release 2.0 of the Magnuski family went into Beta-test this morning at 3:28 AM PST. Code named Sarah Emily, features include a shipping weight of 8 lbs 13 oz, and length of 20". Both mother and baby are doing very well.

73, Hank

HI HANK,
1. SORRY I HAVEN'T BEEN DOING MUCH PACKETEERING LATELY. I'VE BEEN STUDYING HARDER THAN I'VE EVER DONE BEFORE FOR MY ORAL EXAM ON MAY 31. HOPEFULLY I'LL 1)PASS AND 2)BECOME A NORMAL PERSON AGAIN. WILL PROBABLE MAKE IT TO THHE MAY PPRS MEETING THOUGH.
2. I WILL PROBABLY BE MOVING TO STOCKTON IN SEP OR OCT FOR A NEW JOB. I'LL BE DOING SOME ADDITIONAL TRAINING IN S.F. FOR 3 OR 4 MONTHS BEFORE MOVING. DON'T KNOW IF THE REPEATER MAKES IT THAT FAR (KIND OF DOUBT IT). WHAT KIND OF PACKET ACTIVITY IS THERE IN THE SAN JOAQUIN VALLEY? THERE'S SOMEONE ON THE PACKET USERS LIST, KA6ENK, IN JACKSON, AND I'M ONLY ABOUT 50 MILES FROM SACRAMENTO (50 VERY FLAT MILES).
3. WITH THAT IN MIND, I WAS CONSIDERING BRINGING UP APACKET REPEATER USING THE REPEATER PROM IN A VADCG BOARD. I SUSPECT IT WOULD BE LOW LEVEL, PROBABLY AT MY HOME (BUT MIGHT HAVE TO WAIT UNTIL WE BUY A PLACE, SINCE WE'LL PROBABLY RENT INITIALLY.) DO YOU KNOW IF THE REPEATER PROM WILL ALSO SUPPORT AN INDIVIDUAL USER AT THE SAME TIME? THAT IS, CAN I TALK TO IT WITH A TERMINAL (LIKE NOW) AND HAVE IT REPEAT RECEIVED PACKETS SIMULTANEOUSLY?
(IF IT COULD, THEN EVERY PACKET STTATION COULD ACT LIKE A RREPEATER. AS IT IS, EVERY PACKET STAION, I BELIEVE, CHECKS ALL RECEIVED PACKETS FOR VALIDITY AND THEN FOR ITS OWN ADDRESS.
4. WHAT NICE THING DID YOU DO TO KA6M**? I CAN NOW WORK IT SIMPLEX (ALMOST WITHOUT PROBLEM). HAVING THE ERROR CHECKING IS NICE, SINCE EVERY SO OFTEN I HAVE TO SEND A PACKET SEVERAL TIMES (PROBABLY A LOCAL NOISE PROBLEM LIKE YOU HAVE WITH MOTORCYCLES, ETC.)
5. CONGRATULATIONS ON THHE NEW BABY. NANCY IS EXPECTING AT THE END OF AUGUST, OUR FIRST, SO I'M GETTING PRETTY EXCITED ALSO.

SEE YOU, PROBABLY FOR DINNER, AT THE NEXT MEETING.
73, JEFF

Hi Hank,

Just for possible future info, what is involved in creating a "QST" file and linking it to multiple station-directory entries? Does that seem to be working out ok?

I borrowed Brian's EPROM programmer and eraser earlier today, and will be working on the packet/K6GWE/R gateway software this afternoon. I have a second Vancouver board from Stu, and will be picking up the GWE mailbox computer and RF gear this evening. If I don't run into RF problems between the two rigs, I hope to be up and running with the gateway possibly as early as tomorrow afternoon.

--- David, W6RAW

ARRL BULLETIN NR 32 FROM ARRL HEADQUATERS NEWINGTON CT
APRIL 8,1982 TO ALL RADIO AMATEURS BT

At an Open Agenda meeting on April 1,1982, the FCC eliminated two sections of the Amateur Regulations, as part of an ongoing review of rules to prune out those which are no longer necessary. Section 97.71 required an adequately filtered DC plate power supply for transmitters operating below 144 MHz. Section 97.74 required a means of measuring frequency independent of the transmitter itself. Cancellation of these two rules represents a change in regulatory philosophy from how to observe the rules to what the results should be. Other rules still in place require that an amateur signal be clean and that it be in band. The same meeting adopted a Notice of Proposed Rulemaking which would provide for new frequencies for model control in the 72 to 76 MHz range AR

I forsot to mention that I was able to dial AA4KB's computer, and connect to the DG. Best to Cindy, as I am sure that she is "tired" of the "extra person/persons" tassins alons (chuckle). Did I ever tell you that I slipped first wife a "castor oil fruit drink", after she was 10 days late with my first child -- two hours later we were at Children's Hospital and I had a or we had, a 9lb 10oz sirl -- Hi to Nick & save a cisar/cisars for me. 73, -cas-

TO: HM
FROM: SER
SENT: 14 APR 82 22:36:40
READ: 15 APR 82 17:34:51

Hank -

Although the FM-21 is not considered a "clean" rig, I do disagree with the statement that they are not useable by other than RF experts. There are a good many in use in NJ which have survived the years.

As I stated previously, the FM-21 is not suitable for service as a repeater. It suffers from oscillator stability problems. It is however a very serviceable rig for use on a single channel indoors.

The FM-21s coming from Class will DEFINITELY require tuneup! If you feel that this factor will prevent a number of your users from getting them on the air, please say so. We intend to have a 'tuneup' party here in NJ to get all our units on the air.

As far as finals blowing out, the manual states that the output is protected against infinite SWR. After looking at the schematic, I must disagree with the manual; the final transistor could be cooked by running 'key-down' for a while into an open or shorted line. I tried a little experiment with mine. I ran it for 30 minutes straight, into a 50 ohm dummy load. Power out was 12 watts. The final and heatsink was VERY warm after this maneuver, but you COULD hold your hand on it. I then tried to run it into an open line (25' of RG8). This operation REALLY heated the final rapidly. The final transistor was too hot to hold my hand on, after only three minutes. However, nothing burned out!

Do you anticipate sending packets as long as 3 minutes into an open or shorted line? Do you anticipate sending packets as long as 30 minutes into a proper load? Aren't we really talking about a very low duty cycle? ---- Point made?

73, Steve

ps: Do you still want the FM21s, or should I cancel? - S

TO: HM
FROM: DC
SENT: 15 APR 82 07:25:21
READ: 15 APR 82 17:36:15

To: All groups
From: Den

Tonight Lyle Johnson WA7GXD sucessfully tested the terminal interface hardware of the TAPR TNC. This weekend's goal is to have the radio interface also tested. The 6502, RAM, PROM and serial port do seem to operate as expected, using a few assembler routines that Lyle burned into one of the PROMs.

The software group met again, and the parsing of VADCG tasks among members was accomplished. The beta test boards will attempt the following interface tasks:

1) TAPR board in a VADCG net...
Upon signing on and not receiving an I.D. from a TAPR NCS, the board will try to send a VADCG packet. If acknowledged (repeated), the board will either
a) use the coordinator-supplied VADCG address word installed in non-volatile RAM by the user, or
b) try sending messages to high-numbered boards, and use the first available address it finds.

2) VADCG board in a TAPR net...
Upon hearing a board with a VADCG packet format, the TAPR net control station will immediately assume a disipeater role, if not already doing that, and translate each VADCG packet into TAPR format.

I am interested in knowing the best algorithm to use to find unused VADCG addresses in a network. Should I look for high or low addresses first? Telling the difference between TAPR and VADCG packets is easy, since the number of address bytes differs (one vs. two).

More information will be forthcoming as the alpha tests progress !

73, Den KD2S

P.S. There will be an Alpha board at the Dayton hamfest. We will send a debugged board up to Pete Eaton WB9FLW, who is organizing a special Friday night packet radio get-together in Dayton. I will relay more information as Pete calls each packet group.

TO: HM
FROM: LSK
SENT: 14 APR 82 22:49:37
READ: 15 APR 82 17:35:49

Hank, KA6M

Re K6HWJ's input in FM21's. We locally bousht a bunch of these units about 2 years ago and not one has failed under reasonable service. We have them runnins 24 hours per day under link conditions and the only failures have been in the Antenna Relay which wasn't desisned for continuous service anyways. One of our Packet Radio people, Ted Baleshta has developed a PIN diode switcher for the relay and the units are beins used in PR service in Montreal and Ottawa. This in no way disputes the K6HWJ input - it merely reflects our experience. A messase from you to Ted misht set him to write up the mods for the PIN diode. Resards

de Larry VE3QB

HANK:
WELL WE KNEW THE MODEMS WERE GOOD. WE JUST NEVER TRIED THEM OURSELVES.
I HAVE BEEN VERY BUSY WORKING ON A PROPOSAL HERE AT WORK, AND HAVE
JUST READ MY MAIL AFTER TWO WEEKS OF FAILING TO DO SO. A LOT HERE
INCLUDING YOUR MODEM COMMENT OF LAST WEEK.

73, DAVE

Hi Hank, Rick Kawala here, Just thought I'd drop you a line...
New call from KA6STG. Did anyone take minutes that are available
on line of the 4/6/82 meeting? Sorry I missed it... Hawaii called...
I noticed that someone requested the compleete protocol. Is there
anything else besides PROTOCOL.DOC around that I should know about?
Anyway, that's about it. Talk to you later, Rick N6GJGH
Make that N6GJH. Bye.

Date: 13 April 82
From: Cal K6HWJ
Subject: Class FM-21's
To: Hank KA6M

I just talked to Lance Ginner, K6GSJ, about his experiences with the Class FM-21's on the YCZ 220 MHz repeater. His advice was not to touch them with a 10-foot pole. Apparently there was a group purchase of (commercially built) units a few years back, and they all required considerable reworking to make them useable for the 220 repeater. I think the final output transistors kept blowing up. You might want to talk to Lance yourself to find out first-hand just what the problems were. It sounds like the "kit" form would not be very suitable for those members who aren't RF experts.

Date: 11 April 1982
From: Hank Magnuski
To: All Packet Stations

The next general meeting of the Pacific Packet Radio Society will be

Tuesday -- May 4th, 1982 -- 8:00 PM -- AMPEX Cafeteria

The AMPEX Cafeteria is located in Redwood City on Broadway, two blocks south of Route 84. From 101 take 84 West (Woodside Road/Seaport Blvd.) to the first left which is Broadway. Go south two blocks and look for the AMPEX buildings. There is a pond and a flagpole in the center of the complex. The cafeteria is the first building on the north side of the pond and has many glass windows.

Subjects to be covered will be announced when the info is available.

For those wishing to have dinner together prior to the meeting, come to Harry's Hofbrau (84 & El Camino) at 6:30.

TO: HM
FROM: DC
SENT: 11 APR 82 07:37:02
READ: 11 APR 82 21:20:45

To: Hank
From: Den

We've put three more of the Alpha boards together today, bringing to five the number of completed boards, with two more to be finished later this weekend. Our optimistic predictions still show:

Alpha proof-of-performance	2 weeks	(WA7GXD)
Beta layout	3 weeks	(N0ADI,KD2S,WB7ESQ)
Beta PC boards (ass'y,test)	6 weeks	(WA7GXD,KD2S)
TAPR TNC (turnkey!)	10 weeks	(AG7H,WA7PXW,Baker)
TIP software	DONE	(WA7PXW)
LIP software (primatives)	3 weeks	(N7AIG,WA7PXW)
NCS software	4 weeks	(KD2S)
TAPR LIP	6 weeks	(WA7PXW,N7AIG)
VADCG LIP	6 weeks	(KC7MA,KD2S)
TAPR/VADCG (auto interface)	10 weeks	(N0ADI,WA7PXW,KD2S,KC7MA)

We have a great deal of information on the VADCG/AMRAD station and digipeater protocols, but would like to have the current version of protocols in use at your site. This information will allow Margaret, Chuck and myself to be operating on correct information. I will send a copy of this request to other groups.

Incidentally, I spoke at length with Pete WB9FLW, our "Beta test coordinator" in St. Louis. He was very happy that all three Vancouver boards being used to demonstrate packet radio there worked the first time they were turned on ! This is the kind of thing that will convince people that packet radio is coming of age.

Thanks for your help.

73, Den

P.S. I will speak to Rip Monday to pass information on the AMSAT modulation schemes, and to set the transponder performance data. We're also getting an L-band exciter and power supply to test our L-band transmitter project, which now has the backing of the University of Arizona E.E. Department.

Hi Hank & Happy Easter Bunny to Nick:

I am putting in my request for one of the TARP boards at this time, in case there are a few extra. I was also fascinated with Steve's msg. on the ZILOG Z8530 SCC, and wondered if it could be implemented in a repeater. I was considering the possibility of getting a STD bus, and trying to get a another repeater built (any suggestions?).

73, -cas-

TO: HM
FROM: DC
SENT: 09 APR 82 06:08:59
READ: 09 APR 82 16:30:28
CC: HM LSK SER PLR DML JS WWF DC

To: Hank
From: Den

I received the manual this afternoon, and will no longer be sending you copy with errors!

On installing components in the TAPR board, we have found a few problems:
there is one line shorted to a connector pin (easily fixed)
several components are closer to each other than they have to be
one component (the crystal) shorts out a resistor if pushed too far onto the board
a capacitor prevents a voltage regulator from being inserted into its holes

Nothing bad enough to prevent the boards from working, but we will be reshooting the board as soon as it tests out.

I am willing to do two things to get boards up to you:
1) once my board tests ok, I am willing to go silent for a while if you would like to see the board delivered to you.
2) I will send you several wave-soldered, tested, beta-level (re-worked) boards with just the hardware test software and a primative TAPR protocol on PROM, so that people will be able to experiment. I have no qualms about your burning VADCG software and using these boards without any TAPR protocol in them, but I must know the board is working from a hardware point of view before it is sent out. I have spoken now to over a dozen owners of VADCG boards who have each told me a story about how hard it was to get the board on the air, and I would like to avoid that with our boards if possible. There is nothing to prevent a ham receiving a working board in the mail, if we are careful and check all boards before mailing.

I will try to check into this arnet daily over the weekend. I have begun to write the protocol specifications for the TAPR protocol. The only differences in our protocol from a fundamental point of view is the dynamic addressing and lack of modem (just transceiver) turnaround. The addressing is the driving force for a net control station, and the existence of this station allows other functions to be incorporated, all on what I would consider to be level 3a, the interface between IP and the HDLC. The linking schemes mentioned to date in the AMRAD newsletter are just link server protocols, residing in the level 3 protocol, and not meant to be used for what I would call true inter-netting.

I will leave a copy of the protocol specification in a public file here for general perusal in two weeks, when our first revision of the software is done.

Talk to you later

73, Den

TO: HM
FROM: SER
SENT: 09 APR 82 13:33:05
READ: 09 APR 82 16:31:49

Hank -

No action needed on the WD250-Bs. I suspect, due to the "uniformity" of the glitch, that there may be timing differences between the WD and National parts. I spoke with a National sales engineer (not mentioning this problem), and he said that there were somewhere in the order of thirteen (!!!) one-shots on that chip, and that the early versions (of National's part) had timing problems that were temperature-sensitive.

The track-record on the National INS8250 has been very good, so far. We purchased 25 of these for stuffing the VADCG TNC boards. No funny symptoms in the entire lot.

It may be appropriate to alert some of the other groups about the possible problem. The date code on the "funny" WD8250-Bs is 8015. To the best of my knowledge, this problem hasn't cropped up with other lots.

Received your request for the FM-21s. I'll keep you posted on the status of the deal with Ed Cless. We have had many problems running packet radio on 2-meters in the NYC/NJ area. Seems that people treat frequencies as personal territory!!! It makes a lot of sense to expand into the 220 MHz band. One of us (AD7I/2) is experimenting with direct FSK on 220. This brings up a key question - How fast will the TNC boards run when using your style software?

From an engineering standpoint, the lack of adequate buffering on the 8273 is a big headache. I suspect that transmit frame underruns and receive frame overruns will result if we push the speed to the hardware limitations of the 8273. That chip is meant to run in a DMA environment (where its performance is excellent. New designs for TNC boards here, and in other areas, have been considering the Zilog SIO (which is quad-buffered) or the Motorola MC6854 (triple-buffered). Both chips require an external DPLL, but this is traditionally the function of the modem! The clock recovery can be accomplished with a single chip. I guess we could still use the 8273, and install a hardware FIFO in the RX and TX data (buss) paths.

Again, the existance of hardware variants of the TNC board underscores the need for a high-level language approach to packet radio software.

Time for me to get off the soap-box. 73 for now! - Steve

Date: 09 April 1982
From: Hank Magnuski, KA6M
To: Steve Robinson, W2FPY
CC: Paul Rinaldo for AMRAD or QEX bulletins

Re: Zilog Z8530 SCC

There is yet another HDLC chip on the block, and this newest entrant looks like the best chip I've ever seen. It seems particularly well suited for amateur radio applications, and I wanted to bring it to the attention of all people thinking about designing TNC's or controllers.

First, some info straight from the spec sheet:

ZILOG Z8530 SCC SERIAL COMMUNICATIONS CONTROLLER

* Two independent, 0 to 1M bit/second, full-duplex channels, each with a separate crystal oscillator, baud rate generator, and digital phase-locked loop for clock recovery.

* Multi-protocol operation under program control; programmable for NRZ, NRZI, or FM data encoding.

* Asynchronous mode with five to eight bits and one, one and one-half, or two stop bits per character; programmable clock factor; break detection and generation; parity overrun, and framing error detection.

* Synchronous mode with internal or external character synchronization on one or two synchronous characters and CRC generation and checking with CRC-16 or CRC-CCITT preset to either 1s or 0s.

* SDLC/HDLC mode with comprehensive frame-level control, automatic zero insertion and deletion, I-field residue handling, abort generation and detection, CRC generation and checking, and SDLC loop mode operation.

* Local loopback and auto-echo modes.

* Z-bus daisy chain interrupt hierarchy is supported.

* Z8530-PS is 40-pin plastic package, single +5 volts required.
  1-9 = $53.70, 10-99 = $44.80

The price may seem high until you consider that this one part can replace the 8273, 8250 and 4024 on the VADCG, or is the equivalent to two 8273s in gateway service. The part uses a non-multiplexed bus, has full DMA control, and should work well with many popular 8 and 16 bit microprocessors. There are three bytes of receive FIFO, software changeable Baud rates, many options for clocking, and even a method for handling Manchester encoding! Programming this thing won't be particularly easy, but shouldn't be much more difficult than the Z80/SIO or the 8274.

The product specification is quite complete, and I advise all you circuit designers to have a look.

73, Hank

I told Den that he shouldn't hold up distribution of the TAPR boards
until they complete their software, a project that might take a while.
I felt that other people might want to write their own software
for the units. Here is Den's reply:

TO: HM
FROM: DC
SENT: 08 APR 82 05:24:41
READ: 08 APR 82 15:52:12

HANK,

I AGREE WITH YOU ABOUT THE OTHER WORK THAT COULD BE DONE. I WILL GET THE BETA BOARDS OUT AS SOON AS THE ALPHA BOARDS ARE SHOWN TO EXHIBIT NO FATAL FLAWS. GIVE US ABOUT A WEEK TO TEST THE HARDWARE WITH SOME PRIMATIVE ROUTINES, THEN SOME TIME FOR A LAYOUT-MODIFICATION CYCLE. I COULD TRY TO DELIVER BOARDS SOONER THAN JUNE THAT WAY.

I'LL SEND YOU A LONG FILE ON THE CURRENT HARDWARE CONFIGURATION FOR YOU TO PASS AROUND, AND WILL GIVE YOU A "LAYERED LOOK" AT THE DYNAMIC ADDRESSING PROTOCOL, CONNECTIONS TO IP, ETC. A LITTLE LATER ON.

73, DEN

TO: HM
FROM: DC
SENT: 08 APR 82 03:58:37
READ: 08 APR 82 04:40:31

TO: HANK
FROM: DEN

WE ONLY BUILT 12 BOARDS FOR TESTING, BUT HAVE APPROXIMATELY 200 ORDERS, SIGHT UNSEEN, FOR BETA TEST BOARDS.
TAPR SOFTWARE FOR HARDWARE TESTS WILL BE READY NEXT WEEK
TAPR HARDWARE INCLUDES POWER SUPPLY & MODEM ON BOARD...JUST PLUG IT IN.
TAPR SOFTWARE PROTOCOL DUE ON PROMS IN EARLY MAY (NOTHING COMES QUICKLY)
VADCG SOFTWARE DUE IN EARLY JUNE (WOULD LIKE TO TALK TO YOUR BOARDS AT THE SW CONVENTION!)

YOU AND THE NJ,LA,ST LOU,AMSAT & LITTLE ROCK GROUPS ARE ON THE TOP OF THE LIST FOR BETA BOARDS, WHICH WILL BE READY BEFORE THE SOFTWARE....

73, DEN

To: All packet stations
From: Fred Bray, KE6CD
Date: 16-MAR-82
Via: MoJo, AA4KB

San Francisco will be having its annual earthquake exercise on April 21, 1982. I am coordinating amateur radio involvement in the test. I would like to explore the possibility of setting up a few packet stations in various parts of the city to demonstrate its potential for emergency communications. If you are interested in working on the project, please leave a note in my mailbox on this system. [Golden Gate BBS -- (415) 863-7715]
TNX, Fred, KE6CD.

And I will relay replies, if there are any.

TO: HM
FROM: JS
SENT: 07 APR 82 07:59:45
READ: 07 APR 82 16:01:17

Hank et al,

Zilog has a document called THIRD PARTY SOFTWARE which I got from their field rep in Bellvue, WA. The portion that I kept lists two suppliers who have a C to Z80 cross compiler. These are:

WHITESMITHS LTD.
P.O.B. 1132 Ansonia Sta.
New York, NY 10023
(212) 799-1200

Product: Z80/8080/8085 C Cross Compiler
Includes librarian, assembler and linker, etc.
Price: $1300, source $13,000

Product: Pascal Translator creates C code for the C cross compiler.
Price: + $200, source $2,000

Contact: Gabriel Pham

VANDATA
17544 Midvale Ave North, Ste. 205
Seattle WA 98133
(206) 542-7611

Product: Z80 C Compiler is an enhancement of the Whitesmiths. Produces very tisht code. Code tables recoded to take full use of Z80 instruction set. Includes enhanced assembler and optimizer.
Price: $3800 (includes $1300 Whitesmiths licence.)
Hosts: PDP-11 (RSX) & VAX/UNIX.
Contact: Dwisht VandenBerghe

Also of interest misht be:

SYSTEM KONTAKT, INC.
6 Preston Court
Bedford, MA 01730
(617) 275-2333
(617) 275-2910

Product: MACRO-N Written in MACRO-11 assembly lansuase. Runs on all PDP-11s inludins UNIX & RSX.

Z80 $1250, source + $200

Product: MAXL-11 Linkers senerate object code from relocatable MACRO-N output. Various output formats available, e.s. Tex-Hex.

Z80 $350, + $200

Product: PASCAL-X Compilers produce P-CODE for input to the MACRO-N assembler. Intel, Moto and TI processors also supported.
Contact: Mark White

SUPERSOFT
P.O. Box 1628
Champaign, IL 61820
(217) 359-2681

Product: Z8000 Cross Assembler consists of an assembler (ZAP) and a transfer program (HEXLOAD).

Price: $500, source $5000

Product Z8001 & Z8002 C Cross Compiler produces assembler code for cross assembler. Arrays may exceed 64K.
Host: any CP/M System.

Contact: Richard Balocca

Of course the above are all rather high priced for non commercial applications like ours.
Since Microtel holds the Canadian licencing rights to Unix we must have the Berkeley Unix tape that contains the C compilers somewhere in the files. Will continue to keep an eye out.

73 es cul
John, VE7ADE

TO: HM
FROM: SER
SENT: 06 APR 82 19:31:58
READ: 07 APR 82 01:30:56

Hank,

Sorry for assuming that you knew about the FM-21 - It is a relatively old rig. Here is an abstract of the specs from the users manual:

GENERAL DESCRIPTION

The Clegg FM-21 is an all solid-state VHF Transceiver designed for reliable two way FM communication in the amateur 220-225 MHz service. Use of recently developed MOSFET amplifiers and mixers combined with the latest in integrated circuits and monolithic filters yields performance comparable to that expected in the lower frequency bands. An exclusive feature of the FM-21 is the CRYSTAL SAVER technique which permits use of a single channel crystal for both receive and transmit in SIMPLEX and REPEAT modes. A single channel crystal suffices for three functions:

1) Transmit on Repeater input frequency

2) Receive on Repeater output frequency

3) Receive on Repeater input frequency

This multiple receive frequency capability will be of special value to Repeater control stations and implements compliance with provisions of FCC Docket 18803.

The FM-21 is designed for mobile operations from standard 12.6 VDC (negative ground) vehicular systems. Current consumption is sufficiently low to permit "cigarette-lighter" operations. A convenient mobile mounting bracket is furnished with the FM-21. The unit will perform as an excellent base station when used with an external power supply.

The FM-21 is factory wired for 6 channel operation. Up to 5 additional channels may be readily added with an inexpensive modification kit. Crystals for the CRYSTAL SAVER can be furnished directly from the factory where a stock of all proposed channels is maintained, or from most Clegg Distributors.

Note: The sample FM-21 obtained from Clegg did not have a mobile mounting bracket or microphone. The CRYSTAL SAVER crystals were furnished, as were crystals for 222.98, 223.34, and 223.50 MHz. The power connector, also not included, was readily obtained from Radio Shack. The unit supplied required extensive tuneup to make it operational. A factory preparation "manual" was supplied for this. I believe the minimum instruments needed to do a proper tune-up are a frequency counter (good to 220 MHz), and a high-impedance voltmeter (reading in the millivolt range). A dummy load should also be included in this list. Weak signal sources could be had by loosely coupling a signal from a local repeater to the coax connector. - W2FPY

SPECIFICATIONS

Receiver

SENSITIVITY:	.25 uv (MAX) for 12 db SINAD
SELECTIVITY:	Adjacent channel (40 kHz) down 50 db
SPURIOUS REJECTION:	All down 60 db
AUDIO RESPONSE:	300 to 3200 Hz; Standard EIA characteristics
AUDIO POWER:	1.5 watts at 10% THD to internal or external speaker
SQUELCH:	Noise acuated, adjustable threshold, .2 to 2 uv min. range
MODULATION ACCEPTANCE:	+/-6 KHz

Transmitter

POWER OUTPUT:	8-10 watts (at 13.5 VDC)
MODULATION:	PRE-EMPHASIZED FM with Deviation adjustable from 0 to 7 KHz. Adjustable speech clipping up to 10 db
SPURIOUS OUTPUTS:	2nd and all higher harmonics down more than 50 db all non harmonic related outputs down more than 46 db
OUTPUT IMPEDANCE:	50 ohm nominal. Output stage inherently protected for infinite VSWR
MICROPHONE:	Noise cancelling PTT High Impedance Ceramic (Supplied with Unit)

General

FREQUENCY RANGE:	220 to 225 MHz 222 to 225 MHz to full spec. Power output down less than 2 db at 220 MHz
FREQUENCY STABILITY:	+/-.001% from 25 to 100 degrees F +/-.0025% from 10 to 125 degrees F
PANEL CONTROLS:	Channel Selector Squelch Threshold Volume Mode: 1. OFF 2. SIMPLEX 3. REPEAT
FREQUENCY CALIBRATION:	+/-.001% at 25 F with properly specified Class crystals. * No calibration adjustment or netting required.

NUMBER OF CHANNELS:	6 crystals positions standard. CRYSTAL SAVER provide for each crystal: 1. Transmit Channel 2. Receiver on Transmit Channel 3. Receive 1.6 MHz ** above Transmit channel (PC Board and Channel switch has provisions for up to 5 additional crystal positions)
POWER REQUIREMENTS:	12 to 14.8 VDC STANDBY CURRENT 120 Ma RECEIVE CURRENT 450 Ma TRANSMIT CURRENT 1.3 Amps
DIMENSIONS:	7" Wide X 2 3/4" High X 9" Deep
WEIGHT:	5 lbs. including microphone & mobile mount

Note: Factory tuneup sheet specs RX sensitivity at 0.35 uv for 12 db SINAD. TX spurs speced at -33 db. - Beware! - W2FPY

Applicability for wider band use or direct FSK, etc. RX IF frequency is 41 MHz (1st IF) and 10.7 MHz (2nd IF). RX uses monolithic crystal filter, and will be VERY broadband if filter removed or replace with wide-band unit. TX looks like it can run much wider-band deviation with little adjustment. The FM discriminator is a CA3075. It seems serviceable for higher bit-rates. The PC board is large, with very "open" construction. This should make all "mods" simple.

The local RTTY group, here in NJ, says that there was a standard modification for using these rigs for AFSK. Basically, it involves injection of high-level audio to pin 1 of IC4 (MC3301). This leaves the mike-line available at all times. Similarly, you can tap audio off the speaker line, and leave the speaker on (your option!) at will.

Folklore here also says that the FM-21 is a poor mobile rig, due to temperature/stability problems. Therefore, it would not make a good RF deck for a disipeater (unless kept at home).

I hope this satisfies your curiousity! I can supply more details about this rig as needed. Ed Cless (W3LOY) is anxious to sell out his entire stock of parts for the FM-21, and this might include many spares, etc. He suggests that, if we don't need the box, he could simply supply completed and partially completed boards (one PC board for RX and TX). Incidentally, T/R switching is solid-state, too.

PLEASE BE AWARE!!! I don't know how many of these rigs are complete. Ed says he will be able to supply anything needed to finish them, but he still hasn't filled me in on how-much-of-what is in his warehouse. It is likely that some parts will have to be stuffed onto the PC board to make it operate. You will definitely have to do the tune-up.

TO: HM
FROM: DC
SENT: 07 APR 82 08:24:13
READ: 07 APR 82 16:02:25

TO ALL PRNET MEMBERS

The Tucson Amateur Packet Radio group has started the alpha test phase of the TAPR terminal node controller today....

Our first dozen printed circuit boards are finally here, along with all of the necessary components. Cost for the TNC with integral modem and power supply is $125 ! We should be able to keep well below $200 in a complete package, including connectors, cable and fancy box...

I expect many weeks of wrestling with FORTH software and PROMS before the boards will be speaking both TAPR and Vancouver protocols, but we should have something to show st the SW ARRL convention in early June.

We won't release the wave-soldered, pre-tested beta boards until we are sure of the hardware and software, so I'll keep all informed of developments...

73's

Den KD2S

Re: DEBUG

Just looking for a way to pry into the ZORK file, at least until GNU finds the source. It seems to be looking for a file somewhere,,,,, have you tried moving (Z) to the util/utils dir, as I noticed that it suggested that a heap file could be placed there to store an all ready in progress game.
This activity, of course, is hobby oriented (playing games), and can be put aside.....except for the fact that it is a very good study in CAI.....
73, -cas-

Date: April 4, 1982
From: Curtis, N6ECT @PPRS:SFO

To: All Interested 'Packeteers'

Subject: FCC PROPOSED RULEMAKING PR Docket No. 81-699
(concernins Disital transmissions)

Under the file ' DOCS ', listed under the title ' FCC.RULE.DOC ', is the entire seven page proposal "In the Matter of Use of Additional Disital Codes in the Amateur Radio Service."; in case you have not had a chance to obtain a copy.

73,

-cas-

+9999999999999999999999999999999999999999999999999999999999999999999999999999+
CANNOT DELETE PERMANENT FILE
+9999999999999999999999999999999999999999999999999999999999999999999999999999+

To: All packet stations
From: MoJo AA4KB/6
Date: 04-APR-82

This message received on CompuServe HAMNET today:

#: 3674 Sec. 9 - RTTY/PACKET PEOPLE
Sb: RTTY/PACKET RADIO
04-Apr-82 12:09:38
Fm: Jim Jones WB9QZN 70050,201
To: ALL

Packet Radio is getting started in Chicago, W9SKD and myself WB9QZN (VQ9JJ) are working on getting something work up. Right now Dick (W9SKD) is getting an RTTY BBS going. This is running under CP/M, using a modified version of BYE75 and RBBS. We are using my BBS as a clearing house for Packet Radio information. The phone number is (312) 759-7005. Voice (312)759-4747. The BBS will accept 300, 450 and Ma-Bell 1200 Baud rates. If the phone rings more than once, then I'm using the computer. Most times I get the BBS up by 11 pm CST. I will try and check into here at least once a weekend.

73's Jim WB9QZN

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Date: 4 April 1982
From: Dave, W6RAW & Hank, KA6M
To: All Packet Stations

We will be getting together for dinner at Harry's Hofbrau, located at 84 & El Camino in Redwood City, at 6:30 PM on April 6th. Anybody who's interested is welcome to join us.

Hope to see you!

Dave & Hank

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To: Hank, KA6M

From: Bill, WB6SDE

Subject: 220 MHZ Radio

Hello Hank,

I understand a number of 220 MHZ radios may become available to the PACKET net. I would be interested in one if the price were in the range listed in the notice. Please keep me informed of any other announcements. Thanks..

SUL

Bill

TO: HM
FROM: JS
SENT: 03 APR 82 19:18:38
READ: 04 APR 82 00:41:23

Hank,
The project I am involved with at work is a unit similar to the TNC board but with four async ports and X.25 on the line side. I am looking after the hardware design so I am not yet much concerned with the high level software which is in C. The programmers are still looking around for compilers and linkers to achieve exactly what you are considering. The C source is currently on a PDP 11/70 and will be switched over shortly to a VAX, both under UNIX. The compilers, etc. will be run on the VAX. There were several other names of software vendors we found but I'm not sure if they would be much use to us since the packages are probably meant only for the larger machines.
If the source code you came up with were compatible with the compiler we settle on I'm sure it would be possible to run it through up here. The problem of course would be in shipping the files back and forth during debugging.
I'll get the vendors' names in case they are any use to you.

73 es cul
John, VE7ADE

TO: HM
FROM: SER
SENT: 01 APR 82 23:09:21
READ: 02 APR 82 00:55:48

Hank,
I have a list of C compilers available for various microcomputers; I'll put this on here at a later date... In the meantime, I have recently discovered that there is a tape available from Berkeley that runs in the UNIX V7/Berekeley UNIX environment. This tape contains a full-blown C compiler, plus the utilities needed to compile and optimize native code on all the popular 8-bit micros (noteable exception, the 6502), and several 16-bitters. Needless to say, I'm getting a copy of this to run on my UNIX system at work.

Typically optimized C programs occupy about 30% more storage than equivalent typical assembly language programs. The execution times vary with the nature of the benchmark, but communications programs are generally very fast. The benchmark we will use in NJ will be to rewrite the TIP and LIP software in C, and see if we can stuff it into the VADCG TNC memory space (Grunt!!!). This reminds me... Since some of PASCAL can be translated into C code (both are pointer oriented languages), do you know of any documents stating the link level 2 in PASCAL defines? This would save a bit of work!!!

73, and more on C later...
Steve, W2FPY

Date: 01 April 1982
From: Curtis, N6ECT
To: All Packet Stations
Re: KA6M** Activity Report for March

Calls lossed March 1982

AA4KB	127
N6ECT	71
K6VCO	27
W6JHJ	14
KA6NAN	13
W6CB	12
N6FTZ	11
KA6STG	9
WA6RZW	7
KA6ETJ	7
KA6M	7
WA6SLF	6
KD6LI	5
WB6SDE	5
AD7I	3
WA6JFZ	3
WB2CAM	2
WB6YMH	1
N6FQR	1
GNU	1
?	2

There were 334 calls lossed on to the DG.
252 calls were made via radio.
82 calls were made via telephone.

73, Curtis, N6ECT@PPRS!SFO

Date: April 1st, 1982
From: Hank, KA6M
To: All Packet "C" Freaks

Several packeteers have mentioned the possibility of using the programming language "C" as a good choice for implementing higher level protocols. Would like some response on these questions:

1. What 8080/Z80 compilers are out. I know about BDS, Whitesmith's, and derivations of tiny-C. Any others? How well do the above work?

2. Any experience in linking the code generated to assembler and putting the whole thing into ROM?

3. How do you forsee using C? As part of a combined CP/M-VADCG system?

Any input would be appreciated. Thanks.

73, Hank

TO: Mr. Henry Magnuski
311 Stanford Avenue
Menlo Park, CA 94025

FROM:

Jon Titus KA4QVK
P. O. Box 242
Blacksburg, VA 24060

MESSAGE

SUBJECT

DATE

FOLD

Dear Hank:

I've seen your name in several AMRAD Newsletters and thought I'd write and see if you and your group have any printed or published info about what you're doing with 2M packet work.

I'm interested in getting something started in this area and am pretty well acquainted with microcomputers and serial communications. I'd like info on the Bel 202-compatible modems and specifics about the format or protocol that you're using.

Thanks for your help. 73

Jon Titus, KA4QVK

3/30/82

SIGNED

TO: HM
FROM: SER
SENT: 31 MAR 82 02:40:41
READ: 31 MAR 82 04:12:34

To: All Packet Radio Groups
From: Steve Robinson, W2FPY
Subject: 220 MHz FM transceivers

We have the opportunity to make a unique group purchase of a large number of 220 MHz crystal controlled FM transceivers. Ed Cless, W3LOY, has been informed of the need for some inexpensive gear for use in packet radio. His answer to this need is the old Cless FM-21 transceiver. The FM-21 is not very modern, but is all solid-state (including T/R switching), and has an output of about 10 watts.

Ed informed me that he has somewhere in the order of 500 sets of parts for the FM-21, in various stages of completion, from simple bare-boards & parts, to completed boards. The FM-21s have been "written-off" as saleable items, and will go at a small fraction of cost. Estimates are that they will cost anywhere from $30 to $60 each (complete), depending upon how many parts are in common with currently used stock (you know, tuned coils, etc. - they NEVER get out of date).

The bottom line is this - The rigs won't be sold by him one-at-a-time, but if we were willing to make a group purchase, he will fill the orders. If you want to get on 220 (for packet radio, of course), want to get on inexpensively, are willing to complete a partially completed commercial rig, and are willing and able to tune it up, THEN THIS IS FOR YOU.

Nothing has been firmed up yet. I would like an indication from all packet radio groups as to how many would wish to purchase rigs. If enough respond, I'll give that info to Ed Cless, and we can negotiate the price. Please send a list of how many rigs and who they are for, and I'll follow up on this one. I'd be happy to supply more details on this deal, on request. Please DON'T confuse things by contacting Cless directly - let me handle it as a group purchase.

73,
Steve, W2FPY

ps: Many thanks are due Rip, WA2LQQ, for initiating the search for inexpensive packet radio RF gear....

TO: HM
FROM: SER
SENT: 30 MAR 82 15:05:04
READ: 30 MAR 82 17:36:41

Hank -

Just a few thoughts about your LAN design discourse....

1. Overlapping domains: If the same frequency is used by all, this is just another extreme case of TDMA with high channel loadings. We can allow it as long as channel efficiency remains high. I feel that the LAN should have its own HDLC address so that a terminal node can choose which of several LANs on frequency to make transactions with. .... After all, I may have several phone numbers at home and at work; there's no reason why I can't access several different LAN's by packet radio. The big question here is not the mechanics of TDMA or addressing within an LAN, but of how DX (multihop) traffic is passed in and out of the LAN. This brings up the concept of the "HOME NODE(s)". Something has to establish the terminal node as a member of the LAN(s). I would suggest that all users require a one-time-only login with the LAN in order to establish their addresses (Callsigns) with the LAN service directory.

2. Control stations for repeaters: I'll ask you the question! Can we get away with repeaters that aren't controllable by someone?? After all, how do we establish and maintain routing tables (I'm assuming the table-driven routing scheme)? I think software update of such tables is premature. I would like to see users (terminal nodes) with limited control over the LAN repeater services. For instance, ability to do call forwarding and call waiting, etc.

3,4, & 5. No contention.

6. Direct connections: Why? Why must we have protocols that handle the exceptions? If people want to handle transactions directly, they should probably go off net and off frequency, and use a different protocol (firmware switch). I don't think we should concern ourselves with exceptions like this.

7. No comment

8. Again, why can't we use a uniform exchange locally? If the processing overhead for an IP header (and transmission time) is not significant we should use it always! (I'm playing the devil's advocate here.....) Anyhow, WHO SUPPLIES THE IP HEADER??? The terminal node?? The LAN repeater service??? If you want to keep the TNCs small, you probably don't want to do too much work at this level. On the other hand, even the mightiest micros will be crushed by having to handle the translation from local to IP protocol for a large number of stations with 'DX transactions'.

9. Small number of hops, and use of IP versus non-use: In order to get away from the use of a big header for short hops, we have to carefully consider the network hierarchy (NOT TOPOLOGY). I will break here, and prepeare a text on HIERARCHY for your perusal - then I'll continue with the commentary.....

73, for now
Steve, W2FPY

Hank,

No, I have not done a compare on a download yet. Actually, I'm not sure when I might have that capability. But anyway, I've made a couple of patches to the code that aren't reflected in the source files yet, so now is not the best time to spread them around.

They did make good tests of my uploading capability.

Mojo

RIG TELEPHONES, INC.
P. O. BOX 2713 • LAFAYETTE, LOUISIANA 70502 • (318) 234-3438

March 26, 1982
Letter No. 82:032

Hank Magnuski
311 Stanford Ave.
Menlo Park, CA 94025

Dear Hank,

The poor souls in our town that are afflicted with the twin scurge of having hobbies in amateur radio and computers are trying to spread the faith and organize. We are in the process of proposing standard so that we may communicate with one another. In this regard I am solicitating your help. I would like to know what baud rates, frequencies and frequency shift that your organization is using and are planning to use. I am also interested to know what protocol may be used in packet switching.

Yours truly,

Nick Pugh
K5QXJ

NP/bva

3/20/82

Hank: I am in the process of setting the mailing together and have a few questions. If I understand it correctly, I should only send to those persons that have something after STATUS on the mail list? Are you going to send me a little more re: subjects to be covered?

73, N6ECT @PPRS!SFO

Hank,

All three source files required for TRS80 packets are now on the DG. See TRS80+. There are a couple of undocumented patches that are not in the source files at this point, but I had fun uploading them. I intended to put the stopwatch to the upload of LIP, but fell asleep during it.

Here is an interesting phenomenon? While I am doing a disk dump on packets, all of my time delays shrink (as if by special relativity). My IDer starts going off less than every three minutes, and the timeout delays shrink to almost nothing. I find this strange, because I expected exactly the opposite to occur. Does anything similar occur with the VADCG board, or is this one unique to my software? My IDer normally shoots every eight minutes, or slightly less.

73, Mojo

To: All PPRS Members
From: Mojo, AA4KB
Date: 27-Mar-82

I highly recommend the file ARRL_B26.TXT for readins. It is the leasue's official report of its semi-annual board meetins, and contains many thinss which may be of interest to all of us. Notable, of course, is the election of David Sumner, K1ZZ, as Secretary and General Manaser of the ARRL. Havins worked closely with Dave, I feel very stronsly that they could not have chosen a better man for that job. He is known and respected internationally, and is a very brisht, forward lookins individual, besides beins a world-class operator.

But also of more immediate concern to the PPRS is the board's decision to fisht any amateur license without a code requirement. I believe that it is the seneral consensus of this srouр that a morse code test is not desirable for the srowth of disital radio techniaues. I have lons been an advocate of CW, and it is still my much-preferred mode of operation on HF. But I also believe that a code-free "disital" license for VHF data communications is a desirable item in the FCC resu-lation structure.

I would like to see the PPRS consider at its next meetins adoptins a resolution addressed to the ARRL and to our Pacific division directors ursins them to reconsider their resolution at the last board meetins. I would also like to see the PPRS form a committee to draft a rule-makins petition to the FCC for the adoption of a "disital" amateur radio license.

This letter is solely the opinion of the author, and does not reflect the policies of the PPRS.

Morris Jones, AA4KB

Date: 23 March 1992
From: Gunter WA6ETT @PHSSIRO
To: All Packet Stations

Copied exactly from the WESTLINK broadcast for amateur radio:

On Sunday March 7th a group of Los Angeles based amateurs WA6ETT, WA6WSV, and WA6RFJ demonstrated packet radio to Dr. Robert Kahn, one of the primary developers of packet radio. Now what made this demonstration unique is that it took place in a Cessna 210 flying above the Los Angeles basin and in a van on the streets of Los Angeles. The four amateurs are all researchers at the Information Sciences Institute. An all assembled and multi-station packet radio system including a self-contained unit that can be used on a car, boat, or airplane. As Dr. Kahn was flying over the L.A. basin this packet radio aboard the airplane was linked by 2 meters to a ground station at [illegible] Mountain but that's not the end of the story. The packet radio unit at ISI was connected to a computer network called ARPANET across the country in Arlington, Virginia; where Dr. Vinton Cerf, an associate of Dr. Kahn's sat at home in front of his home [illegible] computer. Now information sent from the airplane went to ISI via amateur packet radio from there onto Virginia via the ARPANET and then into Dr. Cerf's house via the telephone. In addition to being used as a flying command post the system worked like a charm and can also be used as an excellent phone and computer network.

[illegible] Dave [illegible] Radio Bell [illegible]

I found a bug that was causing me to drop characters during a file upload, and corrected it. Now is there any way to prevent the DG from overloading on input? I got a very clean transfer up of "trs80_tipio.z80". One line got a touch garbled early in the transfer, then the entire end of the file was dropped, maybe fifty lines. The DG doesn't send a ctl-S to the VADCG, does it. Perhaps I should write a "file transfer" program for the DG that accepts input and dumps it to a file. (also getting rid of those nuisance right-parentheses). Can an applications program on the DG detect a "nearly full" situation and transmit a ctl-S to the VADCG? I may need some documentation from you for this -- and it might be a good chance for me to try a first Pascal program.

73, Mojo

TO: HM
FROM: JS
SENT: 20 MAR 82 22:16:06
READ: 21 MAR 82 17:50:13

Sorry but the boards have not been sent yet. I still have to convince Don when I can catch him to send you the boards without the documentation. Al Mar is getting a final version of the schematic ready since Bob, VE7CYB is still pre-occupied with assembling and testing his 50 boards. He will still have to find time to put down the assembly instructions for everyone else who wishes to assemble their own. If you don't already have the EXAR spec sheet [illegible]

How is Packet Radio progressing in the Bay area? What sort of activities you have under way? As soon as we get the two pcb's under control I will be starting the process of adding a TNC to my ABBS so it will permit a mail drop function for the network. Also hope to use PR as a semi automatic long distance link for the ABBS telephone callers. (Thus starting the interesting [illegible] KA6M** along these lines?

If I haven't already given it to you, the VADCG ABBS is at 604 437-7001, 300 baud and starts up on DCD.

73 es cul
John, VE7[illegible]

TO: KM
FROM: DML
SENT: 19 MAR 92 05:05:16
READ: 19 MAR 92 23:46:34

To whom it may concern:

I have another 'shed' with SM3HEV on Sunday March 21. Jens will be using his call SK3EM which is the club station at the University of Linkoping. We will discuss the state of the 'Sofinet' project at the University.

We will try three different frequencies:
at 1500 UT on 14,175MHz
at 1515 UT on 21,220MHz
at 1530 UT on 28,470MHz.

We will settle on the frequency that gives the best results out from our experience this is likely to be either 15 or 10 metres because 20 metres is usually very difficult.

Please try on 10 if you want to join in the QSO and we will be like to work up to frequency in the Ute: shore band.

Doug Lockhart VE7APU/1

TO: All packet stations
FROM: Fred Bray, KE6CD
DATE: 16-MAR-82
Relayed by: Mojo, AA4KB

SAN FRANCISCO WILL BE HAVING IT'S ANNUAL EARTHQUAKE EXERCISE ON APRIL 21, 1982. I AM COORDINATING AMATEUR RADIO INVOLVEMENT IN THE TEST. I WOULD LIKE TO EXPLORE THE POSSIBILITY OF SETTING UP A FEW PACKET STATIONS IN [illegible] FOR EMERGENCY COMMUNICATIONS. IF YOU ARE INTERESTED IN WORKING ON THE PROJECT, PLEASE LEAVE A NOTE IN MY MAILBOX ON THIS SYSTEM. [Golden Gate BBS -- (415) 863-7715]
TNX. FRED, KE6CD.

And I will relay replies, if there are any.

Hello Hank. How goes life? Saw the note re the next meeting on 4/6/82. UNfortunately, I won't be around then, so I was wondering if someone was taking minutes. If so, I would appreciate a copy of them. I'm using an IBM 3101-20 terminal, BTW. HOw would I try the VT-52 (or whatever it was) mode? What would the command be?

Talk to you later, Rick

I'm curious about how you handled the RANDOM routine for your H-8 system. The clock for our computers is considerably slower than the VADCG board, and of course all of the timing values needed to be shortened. But shortening the values being returned by the RANDOM routine was not as simple.

I have modified the routine now, but I wonder if my wait delays may have become too short.... Performance on the system seems to be pretty good, but now I seem to need to re-lengthen my timeout values.

Appreciate your help,

Mojo, AA4KB/6

Hank,

I've made some improvements to my terminal display and sending routines. I've added the capability to send and [illegible] and \\\, which makes life much easier on the DG. Also I've built the skeletons for seven functions to add to the routines later. Two will be for disk I/O.

I would like to get together with you over lunch (or otherwise) again to discuss adding the internet headers to the packets. Also I need to ask you about the various timing loops in the program and the random number generator. My terminal is spending much too much time on turnaround and timeout, and I'm not sure that shortening the numbers considerably has helped much.

I'd also of course like to see what you might have to [illegible] about my possible move to Microfro. It's beginning to look inevitable. Among other things, I've also asked them to exclude all of my inventions and future development work related to [illegible] radio. I would be working on a new [illegible] system for a four-user Z-80 system, which sounds to me like wonderful fun!

I also realize now that I forgot to display tabs correctly. Ah, well, back to the editor.

73, [Mojo, AA4KB\6] tee hee ... \!/

Mail returns, not deliverable:

Doug Ord, 1172 W. McKinley, Sunnyvale, Ca. 94086

P.S. Saw your picture in Vol. 2 of the ARRL AR Computer Net. Conf., but have not had a chance to read it.
I also had a conversation with KD6SE, who sussested that we should should leave 146.580, and move elsewhere, as we are interferrins with his ability, to send RTTY to his friend 4 miles away. I backed down, and said little, with the exception that I was a "newcomer" to amateur radio, and could not present any kind of a case. I did say that I would mention it at the next "steerins meetins".

That's it for today..... 73, -cas-

TO: HM
FROM: PLR
SENT: 06 MAR 82 13:51[illegible]
READ: 06 MAR 82 21:[illegible]

TO: HANK,KA6M
FROM: DAVE,K8MMO
[illegible]

1. WE NEED 8273s. We are all out here. I have 10 boards just received on consignment from Vancouver, but no chip sets. I just sold two and those guys need chips.

2. The latest packet newsletter suggests Doug's old gang is paying $50 for them. That is what my supplier here suggests in plastic ($73 in ceramic). If you want to go a 100 buy, I could help by taking fifty. Maybe it is time to push Intel on the offers?

3. Glad you like the repeater program. Jon, KE3Z does fine work. I am burning one for the St. Louis area tonight. They are a great way to get the city on the air. People hear the repeater and want to take part.

4. I finally received my $17 CPU2 board from my friend in Texas. Sorry there are probably no more at that price. Anyhow, I will be interested in your internetting software. I am going to bring it up with a prom at $E000 and 6116 ram (now $7 per- back of Byte). Then, I will download programs to it from my "big" S100 machine.

5. You are having a baby? Could be good trick! Glad to hear about the development, but it could slow down your packet activity a[illegible]. The little ones do not sleep on our schedule.

6. Yes leave all QEX here. I read the mail, dump it to disk, call up Paul and dump it to him. He then edits it and prints final version on his printer which he takes to commercial printer who mails it out. All submissions are gladly taken.

73...Dave and the AMRAD gang

Hank -

I see that u have 'Coed' on your system. Is it practical to use a screen editor thru packet ? I can't see why not (except the VADCG board requires a CR to transmit, and simple control characters .....) Oh well. Any docu for Coed ? Someday we misht actually break down and move to AOS, so thats why I am interested in evaluating a screen editor.

Seems like the Packet group is reaching 'takeoff' velocity !! I gather something (like a repeater) is about to happen on 450 Mhz. Any news on it ?

73's, later
de KA6NAN

I have plans to speak to a representative from Alaska today, about the proposed "packet network". It was also stated that "Red" will announce his intentions to run for governor tomorrow. Would you like to be present when we get into the "nitty-gritties" of establishing said network? From what I understand, Red will be in the Bay area around the computer fair, and will "get into the material $$ proposal". Ann and I are thinking about going up to Alaska when it gets warmer, as her sister & om have a house and their fishing business up there.

73, -cas-

TO: HM
FROM: DML
SENT: 04 MAR [illegible]
READ: 04 MAR [illegible]

Hank,

[illegible] anyways on [illegible] then. The order has been in for some time now in Seattle, I [illegible] so it would be best to let it alone unless you need a [illegible] sue later on that we might both benefit from.

Will call Don, VE7AOG, as soon as I'm finished here to have him send the bare boards. Unless Bob, [illegible] moves very quickly, the documentation will not be ready until later. Hopefully less than a week. I will put up a copy of the material list on here to help you get started in the [illegible].

[illegible] you get at [illegible]. Could you tell me what your customs does when we send such boards down across the border? He've never heard anyone [illegible] on [illegible] although I guess quite a few were sent from [illegible]. The boards were made in the States if that helps.

Thanks es 73,
Jann

[illegible]

Here is the 1200 baud radio 202 modem material list

220r 1/4w	R19
240r 1/4w	R27,28
2k2 1/2w	R2,4,10,37,38,40,42
	R20
4.7k 1/4w	R1,3,5
10k 1/4w	R16,18,24
33k 1/4w	R15
39k 1/4w	R33
56k 1/4w	R17,25,26,30
47k 1/4w	R12
100k 1/4w	R21,22,31
470k 1/4w	R23
510k 1/4w	R13
1.2M 1/4w	R24

1nf	C9
3.3nf	C11
10nf	C16
33nf	C3
47nf	C12
100nf	C5,6,7,8,15
150nf	C14
1uf 16V	C4
10uf 16V	C1,2,13,17,18
68uf 16V	C7

D1-D10	1N4148 or any small signal diode

Transistors:
Q1-Q5 2N3906 or equiv.

UDDPACKET$KA6M_FM_VE7ADE_04

$ type
U1 4069 CMOS hex inv.
U2 4528 CMOS dual MMV
U3 XR2206 vco
U4 XR2211 demod.
U5 4053 CMOS analog sw.
U6 LM324 quad opamp

LEDs: almost any LED will do. Current use:
DS1 [illegible]
DS2 RTS red
DS3 TXD red
DS4 RXD green
DS5 DCD yellow

Let us know how the boards work.
CU, JOHN, VE7ADE

TO$ HM
FROM$ DML
SENT$ 03 MAR 82 01:36:58
READ$ 03 MAR 82 09:02:01

Hank,

Just noted Bill's message. I was about to ask how the supply of 8273s might be in your area. Stock at the distributors here in the Pacific NW is nil. Has there been any word on the hoped for surplus supply, or can you find any locally at your distributors? I have a requirement for 10 - 50 of them soon and can't get any before the end of this month. We have pretty well all the parts for the kits, but only a few 8273s on hand. I'd appreciate any help you can give.

The modem boards have arrived and are available for immediate delivery except for the 50 Bob, VE7CYB will be assemblins and tunins. They misht be ready in a month or so if he can spare the time from his HF protocol development work.

73
[illegible] VE7ADE

TO: HM
FROM: WB6RFW
SENT: 02 MAR 82 12:06:03
READ: 03 MAR 82 09:01:56

to all:
Julius Madey @ Applied Invention is looking foran 8273 to [illegible]
his VADCG board. If anyone can spare one please contact [illegible]
or me by this net.

TNX Bill WB6RFW

:UDD:PACKET:KA6M_FM_N6EC[illegible]01 3-MAR-82 [illegible]

Date: 01 March 82
From: [illegible]
To: All Packet Stations

Calls Logged February

01).	AA4KB	-	93	13).	WB2CAM	-	06
02).	N6ECT	-	58	14).	WA6SLF	-	05
[illegible]			35	[illegible]			
04).	KA6ETJ	-	29	16).	AD7I	-	03
05).	W6JHJ	-	20	17).	W6CB	-	02
[illegible]	KA6NAN	-	17	18).	K6HWJ	-	01
07).	KA6M	-	16	19).	W6FFC	-	01
08).	KD6LI	-	10	20).	W6RAW	-	01
09).	WB6SDE	-	09	21).	K6HSV	-	01
10).	N6FTZ	-	08	22).	GNU	-	01
[illegible]	WA6RZW	-	07	23).	W9DHK	-	01
12).	KA6STG	-	07	24).	ME (?)	-	01

TOTALS

[illegible] Calls Logged in February
[illegible] Calls Logged via Packet Radio
[illegible] Calls Logged via Telephone

Average = 12 Calls per day for 28 days.....

To: All Interested Packet Stations

From: [illegible] N6ECT

Date: March 2, 1982

My computer challenges any other computer to a game of chess. Challenger may have "White" and move first. I can play approx. six levels, but I don't think that the advanced level is a good idea on my side, as I have ended up playing for about one week, at the longest. It would be nice to have the machines do it, without human intervention, but I am not set up to do that yet; so it will have to be done via CCCCCC. I also feel that there should be an "agreed upon time limit", at the start of the game. Loser of game has to reveal software and machine game was played on.

ANY TAKERS?

leave msg. for N6ECT to arrange
for a schedule.

To: All Interested Packet Stations

From: [illegible]

Date: March 2, 1982

My computer challenges any other computer to a game of chess. Challenger may have "White" and move first. I can play approx. six levels, but I don't think that the advanced level is a good idea on my side, as I have ended up playing for about one week, at the longest. It would be nice to have the machines do it, without human intervention, but I am not set up to do that yet; so it will have to be done via CCCCCC. I also feel that there should be an "agreed upon time limit", at the start of the game. Loser of game has to reveal software and machine game was played on.

ANY TAKERS?

leave msg. for N6ECT to arrange
for a schedule. 73, -cas

Date: 02 March 1982
From: Hank Magnuski
To: All Packet Stations

The next general meeting of the Pacific Packet Radio Society will be

Tuesday -- April 6th, 1982 -- 8:00 PM -- AMPEX Cafeteria

The AMPEX Cafeteria is located in Redwood City on Bradford Way, just south of Route 84. From 101 take 84 West (Woodside Road/Redwood City) to the first left which is Broadway. Go south two blocks and look for the AMPEX buildings. There is a pond and a flagpole in the center of the complex. The cafeteria is the first building on the north side of the pond and has many glass windows.

Subjects to be covered include planning our network link to LA and formal organization of the Society. See you then!

Please keep on mailing list:

W6EMX, F.E. Hudson, 82 Cedar St., San Carlos, Ca. 94070 ✓

P.S. I will keep all the responses for you, and at are next meetins, will pass them on to you. Have you had any response to people who are not usins their assisned number? MoJo, did a sood job, in explainins that 6 pase file that I called your attention to. This put me back on the right track, and prevented me from sendins my "ticket" back to the FCC and settins a "CB" radio. I now see that it is important to set tosether a "comment file", within ourselves, and perhaps submit it. I was let down when I saw those individuals take the responsibility upon them&
lves to construct said document, without
consultins the "rest of the packet community". I felt that matters concernins the transmission and reception of packets, should be deceided by those who were most involved, especially, when they were askins for a prompt approval by the FCC. The only time that I have ever heard of K1RT, was throush his contact with Howard + his work at the ARRL. Anyway, I think that with all this communications equipment available, that there would be BETTER COMMUNICATIONS, but it seems that is not the case. These suys on HAMNET are "tryins" to establish a "packet clearins center", which I am now besinins to question, as it seems like a "little" czar-dom is at hand. It would be a shame to have this kind of a thins so down, seeins, and I say this without "eso", that the "first" public material on packet appeared on the S.F. Conference Tree, and then was transfered around the country. Only only thanks to you, cause you were the one that save me permission to do it.

I asain want to thank you personally, for all the selfless work that you have put into packet radio, and apolosize for beins a pain in the butt at times. It seems to be my lack of understandins, but I am srowins.
73,

-Cas-

TO HANK
FROM JIM KA6ETJ
I JUST WANTED TO INFORM YOU THAT DAVE KB6WP SHOULD BE ON THE AIR SOON.
WE SPENT THE AFTERNOON TROUBLESHOOTING HIS VADCG BOARD.
THE PROBLEM ENDED UP BEING A COLD SOLDER JOINT ON HEADER GOING TO THE TERMINAL.
THE DSR LINE WAS FLOATING SO THE TERMINAL COULD NOT SEND TNC CHARACTERS.
HIS ONLY OTHER OBSTACLE WILL BE HOOKING UP THE MODEM.
SO HOPEFULLY WE WILL HEAR HIM ON SOON.

73'S
JIM KA6ETJ

TO: HM
FROM: PLR
SENT: 27 FEB 82 19:25:48
READ: 28 FEB 82 13:29:07

TO: HANK,KA6M
FM: DAVE,K8MMO
SUBJ: VARIOUS

1. GLAD YOU GOT REPEATER CODE OK. SEEMED TO GO ON SYSTEM EASILY. MIGHT NEED REMOVAL OF ANY GARBAGE CHARACTERS PICKED UP. NOTICE THESE SOMETIMES AS SYNTAX ERROR ON LINE THAT LOOKS SUPER. I RE-EDIT THE OFFENSIVE LINE AND IT WORKS OK.

2. THE NJ GANG IS CERTAINLY THINKING. I HOPE THEY ARE WILLING TO ADHERE TO SOME STANDARD (NBS INTERNET GOOD) ON THE BACKBONE NET. THEY ARE REALLY INTO THIS GROUP CALLUP STUFF. I ASKED STEVE, IF I AM CONNECTED WITH PAUL, YOU WANT TO BREAK INTO MY CONNECTION WITH YOUR QRR TRAFFIC? HIS BOTTOM LINE WAS YES, IT IS MUCH MORE IMPORTANT THAN WHATEVER YOU ARE DOING WITH PAUL. AS LONG AS THEY KEEP IT LOCAL.

3. JUST GOT CALL FROM WB9FLW, PETE EATON IN ST. LOUIS. HE HAS BUILT A TNC BOARD AND IS STIRRING UP ACTION. HE WANTS A REPEATER FROM SO I AM SENDING HIM ONE. HE IS EXPERIENCING SLOW SERVICE OUT OF VANCOUVER.

73...DAVE

The followins is my response to Dave Borden:

Dave,

Thanks again for the repeater code, and please pass alons my consrats to the author for a job very well done. I have some sreat thinss planned for that prosram, and I think you will find the future impact s[illegible]

The prosram assembled and loaded ok, and seems to work just fine. The KA6M/R repeater will shortly be replaced by this code runnins in K6VCO's VADCG TNC, and the KA6M unit will be in the shop for upsrades and the installation of some internettins software.

The Pacific Packet Radio Society had its first "official" meetins on February 23rd. About 35 people attended. The most interestins piece of news was a move by a fellow in ALASKA to install packet radio on a widespread basis and to brins the place into the 21st century. There appears to be some development money available. He's already handins out APPLE/Communitree systems to various folks. More on this later as details unfold.

We were not siven any official notice about the April 3rd meetins. Maybe I can set a VHS tape ready for presentation by then. Can't so cause I'm expectins a baby on April 15th.

We have exhausted the 32 station address space and are now openins up the second block.

Can QEX submissions be made throush this medium? Does Paul see all these messases? Does he want thinss mailed in? Let me know.

73, Hank

Hank: Thank you very much for the data. However, while I plan to eventually brins up a repeater on a hill here in Marin, until that time I will need some way of accessins the repeater. I plan to modify my TIP software to accept my address # from the keyboard, rather than have it permanently in RAM. If you could set me a list of infrequent users, I'll start usins their ID's in rotation - unless of course you have a better idea. Perhaps expand the number of repeater-recosnized addresses? But that's immaterial. We need some way of handlins this properly, not by doins somethins every time we set 16 new users - because they are soins to be comins faster and faster. What, exactly, I'm not sure. Perhaps the repeater should dynamically hand out addresses, on the assumption that we won't have 32 people on the repeater at any one time - as it stands, we couldn't have more anyway...

Also: could you please show me where in the Rules it says that you don't have to license your repeater. As far as I know, anythins that rebroadcasts a signal is a repeater and must be treated as such.

Also: how do I tell AOS that I have a CRT that can backspace and to use the standard backspace key (08 hex) to do a proper video backspace-space-backspace?

Thanks a lot, Rick

Hank:

I thousht that you misht like to know that in the MARCH 1982 issue of QST, pase 58, 'ARRL FILES COMMENTS IN DIGITAL PROCEEDING' the ARRL filed a six pase document. They ended up the article by sayins:

"The Leasue ended its comments by ursins the FCC to act soon on the proposal. It also acknowledses with appreciation the helpful assistance of Ed Kalin, K1RT, and Robert Parnass, AJ9S, in the preparation of these comments."

Now, what I would like to know is, did they (the ARRL), consult with you about these """comments"""; how about K1RT or AJ9S, did they talk to you? Can anyone write these proposals, and who save the job to those suys? I don't understand.

Perhaps, if you read the article, you could help me, as I am feelins a bit confused, thinkins that this kind of stuff, could restrict the advancement of packet radio, if not totally shared with the "entire" packet community i.e. proposals et al.

Or maybe I haven't reached an understandins of amateur radio politics. Sussestions would really be appreciated. How lons has the NJ sroup been operatins "packets", and didn't they set the stuff from you? Didn't the ARRL ask you to fill a "certain" Job relatins to disital communications? Am I askins too many questions?

Thankins You In Advance

[illegible]

Sorry, I was fooling around with Jork, and blew it. Thankyou, but now I I have to go do a consultins job (TV) at 10 am..... so.... One question ...how many people attended the "charter" meeting. You can answer when I log off. I should be back here around 1[illegible] am ???, and it looks like a good day for packet, as it is snow and overcast up here.... 73, -Bill-

Welcome to R.A.T.S. N.E.S.T. System 2
Located in Little Falls, N.J.
Operated by Gordon WB2CAM

This system is dedicated to the dissemination
of information pertaining to Amateur Packet Radio.
Other topics such as computers, telephone systems,
and related subjects are also welcome.

PACKET RADIO IS A REALITY !!!
ON 15 FEBRUARY 1982, A WORKING SET OF VANCOUVER TNC BOARDS WERE FIRST TESTED AND FOUND TO BE WORKING. ON THE 17TH, A SUCCESSFUL TWO-WAY CONTACT WAS MADE BETWEEN STEVE ROBINSON, W2FPY, AND J. GORDON BEATTIE JR., WB2CAM, VIA WA2ENA/R, OAKLAND, N.J.

MoJo and I have been trying to get into the DG, since around noon, but checking the log shows that we were unable to do so until this last check in by my. Needless to say, it is after 6 P.M.. I tried for two hours, around 2 or 3 this afternoon, and could not get past USER NAME. Perhaps I am not as familiar with VHF propogation as I should be, but "everything" is the same as it was at 2 or 3 PM, except that it is now dark. It might be interesting to do a RFI survey in the "bay area", just to try to understand, what might be doing this. I am calling this to your attention, only because of my "curiousity and interest" in understanding the concepts of packet radio. If at sometime, you would like to try a different antenna, or a different radio, or need someone to bring a tall ladder, or some new coax, etc. let me know, as I would be more than glad to help, no kidding "boss".
Well, hope this doesn't seem like complaining, as you can see that this note has apparently made it through. 73, have a peacefull weekend

To: All packet stations
From: Hank
Date: 24 February 1982

Dave Borden has sent us a one page packet repeater program for the VADCG board. The program is to be found in AMRPT.ASM, and the assembled version is AMRPT.PRN.

Hank

[illegible]

TO: WM
FROM: PRNET WWP
SENT: [illegible]
READ: 24 FEB 82 10:25:49

FYI to PRNET users FM WB6RFW (Bill). This message is being resent
from the TYMNET internal account for your info.
73's Bill

Mon, Feb 22

TYM account in-house OnTyme users:

new code release over weekend. If you are setting "barrells" (block-type
characters, not real characters and losing some text) it is because OnTyme
no longer back pressures automatically.

Do the following:

Either log in with "control-r"

or

after log in (or as part of your "init" file) use the new command

:set stop on

Problem particularly on 444 terminals when paper is on.

Best,

--Rob Elmore
Product Marketing Manager-OnTyme

P.S. If you use this option (barrells or not) you will also
be able to stop text output with "control-s" and start it again with
[illegible]

TO: HM
FROM: DML
SENT: 23 FEB 82 20:32:47
READ: 24 FEB 82 10:34:26

PACKET RADIO NEWS FROM SWEDEN

I wrote a letter to SM5HEV, Jens Zander and arransed for a 'sked' on the HF bands. Last Sunday I sot throush on 15 and 10 meters and talked with Jens for about an hour. Signals were very sood both ways. Here are some of the thinss he discussed:

Jens is workins on his PhD at the University of Linkopins. He and Paul Forsheimer and a sroup of undersraduates are workins on develoрment of a racket radio system. They are develoрins both the software and the hardware. They have received permission from the Swedish Board of Communications to test the system on 434MHz, and expect to make the test sometime this summer. I am especially interested in the racket radio they are constructins because they expect it to so at a speed of 100kBaud. From what I have been told the radio is desisned very much alons the lines that I proposed but develoрed totally independently. So far I do not have any details of the circuits, board layouts, etc. but Jens may be sendins some detailed information to me in a few weeks. Jens specializes in the software and Paul specializes in the hardware for the rroject and I suess that the undersraduates do all the mundane work.

Jens also says that Karl Meinzer, DJ4ZC, at the University of Marburs who is a member of AMSAT-DL has told him that they are workins on an Amateur Disital satellite which would work at 100kBaud. I understand that it is beins develoрed with the help of an Amsat sroup in Hunsary. I do not know any details at the rresent time so you can treat it as a rumour until it can be confirmed.

For those interested, I have another 'sked' with Jens this comins Sunday at 1515GMT on 21.220 MHz. My call is VE7APU/3 and his call will be SK5EU. He is usins the club station at the University of Linkopins. If we cannot set through on 15M we will try on 20 at 1730 GMT. I expect Paul to be around for the sked too. The times are probably a little early for you suys on the West coast.

73 Doug VE7APU

TO: [illegible]HM
FROM: [illegible]LSM
SENT: 22 FEB 82 20:54:03
[illegible]

[illegible]
I am sorry I sot nothins at all. I was really out of it and I am still very weak and anxiously waiting for sprins but I am now [illegible]able to set around and at least set my mail and particip[illegible] some with you. Hank I am missins the TRS80 stuff and the Vanco[illegible] HF stuff as well. Please resend and I will pick up and acti[illegible] asap. Thanks to you both.

TO: WM
FROM: WWP
SENT: 23 FEB 82 10:16:02
READ: 23 FEB 82 10:33:02

Hank:

I just got the letter from N6ECT about the meeting tonight in SF. I'm very sorry that I can't make it, I have baby sitting duty .
Is this going to be a regular 4th Tuesday event? It sounds like someone has made an arrangement with Cactus for an occasional link to El Paso.
I finally found a 202 modem to use and have crystals on order for my metrum. I'll contact you for a packet board as soon as I get a few other things squared up around here.

If you would please ask Curtis to keep me on the mailing list and if there are dues or any thing like that due to PPRS please message me were to send the check.

TNX Bill Putney

If you check the log, you will see that I was logged in at 08:45:20 and then ass
logged in, it took about 3 1/2 mins. before it asked for my call "dead air-no re
trace and fix program called ""castor oil" (ha, snicker, chuckle) to clean the '
the IBM that was collecting Os'; I never heard if they found a solution. Anothe
ral users, is the apparent collision between two station's packets and the 'lock
oards. Anyway, like I said earlier, after 6 P.M. there seems to be less of a pr
er. It is also possible that something is wrong on this end, but my cross refer
nto myself via the repeater, which I am able to do at 1 watt. Re: volume contro
s become one of the first things that I check, after "warm-up". Well, I think t
n now. 73, -cas-

TO: [redacted]
FROM: LSK
SENT: 20 FEB 82 15:02:10
READ: 22 FEB 82 08:46:43

To all PRNET people,

This is my first time on since late December. I see by the one messasse to Dous with a copy to me that thinss have been happenins and I'm badly out of date. My absence has been due to ILL Health and one heck of a winter here. I'm basically back to functionins on a regular basis and would like to catch up. Hopins to hear from you all. Larry Kayser VE3QB

Hello again. First off, should I get an ID number assigned to me right now, or isn't that crucial? I heard a rumor that there were only 1 or 2 ID #'s left. Second off, how much crap is involved in setting up a repeater, and which form(s) do I ask the FCC for? And finally, I'm KA6STG - I used to sign in as MYDD. Anyway, see you Tuesday night.

See, Rick

.

TO: HANK, KA6M
FM: BILL, WB6SDE

.

Hi, Hank. I just finished talking with Mel in St. Louis, who is willing to trade a 202 for a logic board. So if you could bring a board and documentation to the meeting, I will send it to him.
He is also giving presentations to others in his area, and asked me to get any general information on packet radio to [illegible]. Since my printing facilities are scant at best, wonder if you have any more [illegible] around? Maybe Curtis is the one to reach in that regard.

.

[illegible]
Bill

Hank, see the mes from me to Stu to see what nappened,,,, anyway to continue,,,Re Addressees!!!!

Ken Berry, KA6ENK, 1508 Arsonaut Lane, Jackson, Ca.; 95642
Dave Billeci, WA6UHA, 25 Charles Ave.; San Francisco, Ca.; 94127
Howard Smith, WB6ALK, 731 Midway Ave.; Colma, Ca. 94015
Woody Teesue, WA6TAT, 7960 Crest Ave.; Oakland, Ca.; 94605

When you see the part about the "black ckeck mark", that refers to everyone with the exception of those that appear on my "calls lossed January" letter.

You can wail at me later.

73, -cas-

Date: 14 February 1982
From: Hank, KA6M
To: All Packet Stations

I recently talked to Gordon Beattie from New Jersey about their progress. They still don't have their VADCG's running (to my surprise) and are less far along than I thought. Gordon invited me to log into his BBS, 201-785-3565, which I did, and I picked up two very interesting documents reporting on some recent meetings. Also picked up all current entries in their conference system concerning packet. These files are named NJ1.DOC, NJ2.DOC, and NJ3.DOC, and you are all encouraged to look at them. They will be on the system for about a month and then deleted.

Regards (and happy Valentine's Day too!),

Hank

Summary of Local Packet Radio Meetins

Location: Wayne, NJ
Date: January 30, 1982
Attendees:
Carver Washburn, W2TFM (Host for this meetins)
Gordon Beattie, WB2CAM
Raymond Heisler, WA2PJV
Stephen Robinson, W2FPY

Protocols for networkins were discussed in terms of black-box structures. This was done so that we could see how our local "wish-list" for network features, and our proposed local network topology would affect the local network and internetwork procedures.

The local "wish-list":

1. Group call-up: In amateur radio activities, it is desirable to send messages selectively to members of a group. If immediate response is unnecessary, this can be accomplished by store-and-forward techniques, with a copy forwarded to each terminal on the list. If immediate response is needed, as might occur in emergency/disaster coordination, or club votins, a "connectionless" form of service should be used - ie: one in which packets may be sent and received without beins enclosed by the connect/disconnect procedure.

2. Amateur callsign addressins: As per the sussestion of the AMRAD sroup (as of meetins 1/23/82), we asree that the only unique station "addresses" are the individual amateur callsisns. We further asreed that these addresses should be seven octets in lensth, thereby accountins for a full callsisn plus a seventh character used to indicate the particular controller, repeater, or device of that individual. In all cases, the seventh octet will be the "unit-select"; calls shorter than six octets will be left justified and padded with trailins blanks up to the "unit-select" character.

3. Interruptable service: In times of extreme emergency, it is desirable to interrupt the normal flow of traffic for a QRR destined for all lossed on terminals. It was decided that breakins a connection without followins protocol misht leave terminals in anomolous states. Connection may be interrupted at the level of the local packet repeater by the repeater originatins the disconnect signals to all terminals prior to sendins "connectionless" traffic. Connectionless traffic must be acknowledsed by all terminals when it is necessary that all terminals are required to receive an error-free messase. Another method for interruptable service, and one worthy of some research, is to provide for, usins the seventh address octet, an emersency channel name. For example, the TNC misht respond to the name "QRR" as well as its native callsisn. This method implies that the TNC can maintain (by TDM) two or more channels of communication. The previous connection, if any, remains unbroken while the emersency traffic is

received and acknowledged. Separate buffers and control blocks will be required in the TNC for implementing this protocol. The connectionless service implies that a permanent virtual channel exists to the TNC with the address "QRR" (or any other emergency name). An extension of this procedure would also allow the group call-ups mentioned earlier; that is, a permanent virtual channel is assigned for each group or service subscribed to. The virtual channels can be established at the first logon with the local node (repeater). This implies that a logon procedure is needed on a first-time basis, before there can be transactions. The logon establishes the terminal as a member of the local network. The implications as to the mpu and memory requirements need further study. It appears that this (latter) method may be the most reliable of the possibilities discussed.

4. Directories and traffic routing: The local node will keep a table of all station callsigns that have, at one time, "logged-on net". This table will serve the following uses:

a) Identification of local subscribers for traffic entering the local net.

b) Call-forwarding - an entry for the address of a remote repeater node is available for re-routing traffic. The update of this is the responsibility of the end-user, not the repeater management.

c) Group channels - one or more group channels (which are permanent in nature) can be assigned to the terminal at logon (or update) time. This cannot be done without limit with present (amateur) hardware!

The group agreed on some general principles which may make the local network and external network "balanced".

1. HDLC framing will be used.

2. The HDLC address field will NOT be used as a unique source address. The unique HDLC source address will be deferred to the I-field. Rather, an address of FF might be used for a "QST", and 00 for all sessions. This usage is still undetermined.

3. The HDLC control field will be used as-is. We hope that the overall network will support the principle of POINT-TO-POINT ACKNOWLEDGEMENT. It is felt that to do otherwise would be wasteful of network resources. For instance, it would be undesirable for acknowledgement and message numbering to be postponed for the end user-terminals in a coast-to-coast multi-hop channel. Each repeater must number packets with INDIVIDUAL NUMBERING for each connection. The implications of this is that the local and internode repeaters must maintain separate control blocks for each session in progress; the control blocks must reflect the number of packets sent and the number received. Since two terminals communicating through a repeater must establish a channel with the repeater, each session via repeater must have two control blocks. The number sent and received can be different from the standpoint of the repeater and the terminal nodes.

4. The HDLC information field will contain [illegible]ne header for both local and non-local service. The first two octets are

reserved for supervisory information. This is to be followed by up to four addresses of 7 octets each. The first two addresses are mandatory; these are the source and destination addresses (terminal node addresses). Repeater source and repeater destination addresses may follow this (optionally) for non-local service. The first address, which is the terminal node source address, will serve as the HDLC source address in local transactions. Note that this still allows for group addressing.

5. The packet length used in local networking should not be fixed at, say, 128 bytes. Rather we should allow variable length packets, up to a maximum of about 512 or 1024 bytes. This will maintain high efficiency locally. The maximum number of bytes per packet may be revised upward if a local high baud-rate repeater can be realized. The packet length of the internode repeaters should be examined closely.

6. Routing was discussed in principle. We are considering table driven routing for local transactions. This type of service is very desirable for the internodal exchanges. The tentative rules are:

a) The local node (repeater) maintains the directory of all station in the local area. This can be done on a one-time-only basis by a logon procedure. It is the responsibility of the terminal user to establish his entry in the local directory.

b) The internode (internet?) repeaters maintain directories of ALL internet repeaters in the overall network. This table will identify the existence of that node, and identify the nearest neighboring repeater(s) to which this traffic can be handed off to. This directory is the responsibility of the repeater management. Although dynamic updating of repeaters may be feasible in the future, it can be handled by voice or written request for now.

c) As in ARPANET, the terminal user can address his traffic to another user as follows: If local (the default), only the destination callsign need be typed out in the request-to-connect. For example: "REQUEST TO CONNECT: WB2CAM". When the station addressed is non-local, the at-sign "@" will be used as a connective to indicate the destination node. For example, to call W4RI from a North-Jersey repeater, type "REQUEST TO CONNECT: W4RI@K8MMO".

d) Call-forwarding. The terminal node user, when travelling out of the local area, can logon at ANY node in the network, and instruct that node to send a message to the users "home-node" to forward all call requests to the current one. Note that this table driven scheme has implicit routing!

The Proceedings of the East Coast Packet Radio Standards Meeting

Flemington, N.J.
23 January 1982

The meeting commenced at about 10:30 with some opening comments by Paul Rinaldo, W4RI. At this time, an agenda which he had prepared, was distributed.

Dave Borden, K8MMO gave a presentation on the fundamentals of packet radio. His talk cleared up some of the mystique surrounding bit-synchronous protocols and the devices designed to implement them. It was noted that the Intel 8273 and the Western Digital 1933 were the only two devices which allowed for the derivation of the clock from the NRZI-encoded data. Dave also brought up the legality of bit-stuffing and the reaction of certain FCC personel to some of the grey areas into which we are headed. The conclusion was that the FCC is open to petitions regarding cw identification, and to requests for authorization to use modulation techniques varying from the present bit=baud regulations.

The FCC also feels that a single frequency digi-peater is in fact a repeater of the time-diversity flavor. Therefore, it is important to remember that these machines must be placed in the repeater sub-bands. This brings up a question as to whether a mailbox station on the lowbands is a repeater. It should be noted that the difference between a mailbox and a repeater is that the relay delay time for the mailbox is longer. Some thoughts on this point would be appreciated by this writer.

The next presentation, was made by Terry Fox, WB4JFI. Terry's comments were on the hardware and software limitations of the Vancouver boards and of the S-100 interface he has designed. It was determined that the Vancouver boards have a maximum link capacity of about 19.2 kilobits. It was made quite clear that for switching nodes, a new hardware design with more "horsepower" would be in order.

Several presentations followed in fairly rapid succession. These were made by representaives of the other groups.

Gwyn Reedy, W1BEL of the south Jersey group reported that several Vancouver boards had been completed and were in the testing phase.

Paul Newland, AD7I of the Holmdel group mentioned that he had 202 compatible modem and TNC designs which were in the process of release. He noted that the TNC was Z-80 based and used the Zilog SIO. This afforded the user two flexible serial interfaces in one package. Some software has been written and the boards do talk. Paul pointed out that the Zilog SIO does not have a clock recovery circuit and therefore requires external circuitry to perform the NRZI-encoding. (author's note: buy a flip-flop...problem solved...).

Steve Robinson, W2FPY of the Ramapo Mountain Amateur Radio Club in Oakland, N.J., described the local progress to date. This included a few completed Vancouver boards, a 220 Mhz repeater for voice and data, plans for a digi-peater and local interest on the verge of explosion.

Bill Ashby, K2TKN of the Cherryville, N.J. Repeater Association has ordered twenty-five sets of TNC parts for his group to use. He described the extensive repeater confisuration established by his group and the Raritan Valley Radio Club. Facilities include a plethora of sites at which the packet network could be located. These are some of the best sites in the state of New Jersey. Bill has also offered some support in the establishment of point-to-point links between systems in the area.

Gordon Beattie, WB2CAM of the Radio Amateur Telecommunications Society outlined his group's efforts. A network of dial-up, password-protected, bulletin boards was described. It is in the first stage of implementation. The next step is the establishment of the on-the-air interfaces. This should be up within the month. This will yield valuable data on the loadings of a CSMA-type network. It will ultimately be a network resource for all on the air to use. Plans for a unified regional network approach are under development and will require much coordination of the groups in the New York-Philadelphia corridor. RATS hopes to contribute to this effort.

A nice (and most welcome !!) lunch was served by our hosts, the Cherryville Repeater Association. Many thanks to Charlie Kosman, WB2NQV for his silent and generous contribution. During the lunch break, a number of small discussions were conducted. These alone were worth the trip !

After lunch Howard Lester, W2ODC who wears the hat of upstate New York coordinator, described the frequency scheme for the inter-city links to be used by the various groups in the state. He also commented on the development of the group as sparked by Dan Connors, KD2S who is on a leave from R.P.I. and living for a few years in Tuscon, Arizona.

W4RI made a presentation on the three elements of "AMNET". They are HF, Satellite, and VHF point-to-point networks. Each will require some variations in protocol in order that the freqencies and modes be used most efficiently.

At this point the K8MMO commenced the "paydirt" portion of the meeting. The Internet Standard suggested was a variation of the ARPANET and NBS Internet Standards. It was mostly a learning and exploratory exercise and further discussions will be required. Dave suggested that the packet frame should contain the amateur call encoded as ASCII. An interesting point is that Dave suggests the addition of an extra character to discriminate between different stations or processes. For example, K8MMO, K8MMO*, K8MMOR. There was some question as to whether the call should be in the HDLC address field or in the information field. This will require further study.

W2FPY made a suggestion of a National Network with table driven software. This was met with all kinds of comments, pro and con, but what Steve had to say made a lot of sense if a sufficient hierarchy is implemented in the network.

AD7I presented an addressing scheme that utilized the address-detection feature of the protocol chips by using a self-assigned "magic" number which would cause the generation of an interrupt, setting into motion the full id-checking algorithm. This number could be sent to the local station node at network logon time. Most of the chips also allow for an "all call" address, and control of the selective receive function. From this it is plausible to work up something for at least the station nodes. Something such as this, is especially useful for busy multipoint switching nodes and other stations handling multiple virtual connections.

Conversation went back to the Internet Standard for a while and then the discussion turned to our next meeting. At the time of this writing, no date has been set, but a general agreement was made to meet at the ARRL in Newington, Ct. on one of the last Saturdays in March and again at the Dayton Hamvention during the last weekend of April. It should be noted that Paul Rinaldo, W4RI will be making a presentation at the Hamvention on packet radio. I am sure Paul is looking forward to a good turnout.

Prepared by,
J. Gordon Beattie Jr.

WB2CAM R.A.T.S.

I have a portion of the packet users northern cal. addressed. So I will only have to stuff & mail. The reason for this note, is the time factor, in reference mailing, BEFORE the "general meeting". Any news as to the meeting location and the software changes. Sorry that I had to cut out yesterday, as I had not seen my guests for about 2 years. Have a nice Valentines, and a nice holiday (that is if Gamma is closed Monday).

73,-ces-

Hank,

The good news is that the chief engineer for the station says there should be no problem in setting the room for the meeting. The bad news is he also said "let me just check and make sure . . ." so I won't have any definite answer until at least monday.

I doubt that it could be counted on as a >>regular<< meeting place; but I will ask him what might be considered "policy" . . . At any rate, it should be a good place for the first one!

MoJo

TO HANK
FROM JIM KA6ETJ
THE INFO ON THE STD BUS I/O CARDS THAT SUPPORT HDLC IS IN THE FEB 3 ISSUE
OF EDN ON PAGE 14.
THE COMPANY IS MICRO/SYS IN LA CANADA CA.
I RECIEVED SOME INFO ON THERE PRODUCTS BUT IT DIDN'T INCLUDE THE CARD IN QUESTIO
I WAS JUST TALKING TO DAVE N6FTZ AND HE WAS TELLING ME ABOUT THE DAYLIGHT EXPRES
I WOULD BE INTERESTED IN HELPING, IF THERE IS ANYTHING I COULD DO LET ME KNOW.
I WANT TO THANK YOU IF I HAVEN'T ALREADY FOR ALL THE HELP IN GETTING STARTED.
I HAVE TO GET BACK WORKING ON THE TERMINAL PROGRAM SO I CAN GET YOU A COPY.
TALK TO YOU LATER.

73'S JIM KA6ETJ

Hank,

Will attempt to keep the file ARRL.BULLETINS as up to date as possible -- HAMNET does not get the bulletins regularly. I may also apply for an OBS appointment so I would get them from the league.

(I would like the appointment for other reasons, too.)

73,

Mojo

TO: HM
FROM: DML
SENT: 10 FEB 82 23:19:44
READ: 11 FEB 82 09:05:31

Doug,

There have been several requests for information on repeaters. If I understand correctly, the program we had in the beacon ROM #5 was adequate for a start. The people at Camosun College are hot to trot and a repeater in Victoria that will guarantee access to Vancouver is one of the things they would like to get started on. They are first on the list for our kit and are anxious to get it as the course they are going to build it on is already going.

John Hopkins at BCIT is also interested in getting a couple of the boards as well and for the same purpose: to familiarize the students with with the latest communications protocols.

Could you send us a repeater PROM suitable for use by the various groups looking for it. We need to publish it in the newsletter and make it available in PROM format. If the present program isn't acceptable (with the beacon part disabled or removed) can you tell me what it might take to get one going?

What is the Digipeater that the San Fran group have going?

Can you find out if Larry got the stuff I sent him on Bob's HF proposed experiment. Could you get his new unlisted number for us. Ken is anxious to get comments from him about it as he has just about finished the wire-wrap and will be ready to start on the air experiments, which Larry offered to help out with by setting up a second board at his end.
I will put a copy of the note in the envelope with the rest of the PSMEI proceedings.

73, John

Hi Boss!

I am ready to do the mailing for the FPRS general meeting. I still need to know --- what location --- has been made available. I will send you a draft of the announcement before it goes out. I will add an extra note for those stations, with assigned numbers, that are not active, explaining the 'lack of numbers'. Another thing, will we implement the new software changes at the meeting or wait for the next meeting?

Thanking You In Advance 73, -ceb-

Date: 09 Feb 92
From: Hank
To: All packet stations

A new command has been entered on the system:

DOCS

A listing of all non-mail text files in the directory will be printed.

Hank,

There are a number of stations on Hamnet (Compuserve) that are interested in packet radio -- I'm going to transfer your message of 7 Feb 82 to hamnet.

It could be a good source of a continuing dialog with the rest of the country.

73, mojo

Hank,
The followins messase received on CompuServe Hamnet:

Sb: #SDLC CHIPS
07-Feb-82 23:21:27
Fm: Julius Madey K2KGJ 70265,1315
To: HANK MAGNUSKI, K6AM

HELLO; LEFT A MESSAGE TO YOU LAST WEEK BUT NEGLECTED TO MARK IT. WB2LKZ (JIM) (EC OF COLUMBIA/GREENE COUNTIES, NY) AND I HAVE ORDERED A PAIR OF VADCG TERMINAL NODE CONTROLLERS FOR USE ON OUR LOCAL ARES REPEATER. WE ARE COORDINATING WITH W2DHT AND W2DOC AND WILL ATTEMPT TO LINK WITH THEM AS A FIRST STEP. BILL (W2DHT) HAS BUILT HIS BOARD AND IS IN THE DEBUGGING PHASE. JIM AND I STILL NEED 8273'S AND I UNDERSTAND IT IS POSSIBLE TO BUT THEM AT LESS THAN THE SINGLE UNIT PRICE THROUGH YOU.ANY HELP YOU COULD GIVE WOULD BE APPRECIATED.73 JULIUS MADEY K2KGJ/K2ZT EX W6FAW

I'll send a reply if you wish . . .
73, MoJo

Date: 08 February 1982
To: Hank Masnuski, KA6M
From: Curtis, N6ECT

Summary of Calls Logged in January for KA6M** System

Number	Call	Calls Logged
01).	AA4KB	128
02).	N6ECT	77
03).	KA6ETJ	37
04).	KA6NAN	28
05).	WA6SLF	25
06).	W6JHJ	17
07).	N6FTZ	17
08).	KA6M	17
09).	WA6RZW	11
10).	MYOB	11
11).	K6VCO	6
12).	GNU	6
13).	KD6LI	5
14).	W6LLO	4
15).	WB6SDE	3
16).	KN6W	2
17).	K6HWJ	2
18).	VE7CYD	1
19).	W6CB	1
20).	W6RAW	1
21).	WB6WBK	1
22).	Y (?)	1
21 various users		401 calls,logged,Jan82

260 calls made via packet radio
133 calls made via telephone

73, -ces- N6ECT

Date: 07 February 1982
From: Hank Masnuski, KA6M
To: All Packet Stations

Today at 14:10 PST Howard Nurse, W6LLO, and K1RT successfully exchanged HDLC packets on 14.075 MHz. The QSO was short and experimental, but packets were successfully exchanged in both directions.

As far as I know, this is the first HF contact on the West coast, and maybe the first HF contact on HDLC packet.

I would be interested in learning of any prior HF contacts to this one. Our thanks to Howard for setting it all together, and opening up a new pathway.

73, Hank

HANK - I WILL PROBABLY NOT BE ABLE TO MAKE THE FEB 8
MEETING. I HAVE TO BE IN STOCKTON MOST OF THE DAY
AND MY WIFE WILL BE WITH ME. IF SHE CAN DROP ME
OFF, CAN I GET A RIDE BACK WITH YOU?
JEFF

HANK:

I WILL BE OUT OF TOWN ON FRIDAY AND MONDAY. I WON'T BE ABLE
TO GO UP TO THE NEXT ORGANIZING MEETING AT CURTIS' ON
MONDAY. I STILL HAVE NOT FINISHED ENTERING THE BY-LAWS.
I MAY TODAY OR TOMORROW BUT DON'T COUNT ON IT (THE BUGGER
IS APROX 30 PAGES LONG). IF I GET BACK EARLY ENOUGH ON MONDAY
I MAY TRY TO GO TO S.F. FIGURE ON MY BEING THERE
IF YOU SEE ME.
73
DAVE

Hank,

Believe it or not I have downloaded INTERNET.DOC. The file has some strange things about it that you should be aware of. The line terminators in the file are two CR and a LF. At first, this prompted me to change my line printer driver so that it wouldn't terminate with a CR. So that worked fine, but Linedit sees each CR as a terminator, and converts 'em to CRLF. I believe page 30 has had that happen to it. Fortunately it only converts pages that are actually "on line" for editing. So I was able to work with the file.

There you have it. Repeater and DG sound very good today!

73,

mojo

TO: HM
FROM: PLR
SENT: 02 FEB 82 16:57:08
READ: 02 FEB 82 20:59:26

FROM: DAVE,K8MMO
TO: HANK,KA6M
SUBJ: PACKET CONFERENCE

1. I AM REVEIWING THE MINUTES OF THE PACKET CONFERENCE WE HELD IN N.J. I WILL LEAVE THEM HERE JUST AS SOON AS I GET DONE. PAUL SAYS TO REMEMBER: HE WHO WRITES THE MINUTES CONTROLS THE RESULT!

/S DAVE

Directions to N6ECT

Via 101:

Take 101 north towards the Golden Gate Bridge
Get off at the Fell Street Exit
Go down Fell Street towards the ocean to Masonic Street
Turn left on Masonic Street so three blocks to Haisht Street
Turn risht on Haisht Street , so one block to Ashbury Street
Turn left on Ashbury Street.
About one half block on Ashbury, on the left is 644 Ashbury
Welcome!

Via 280:

Take 280 north to San Francisco
Get off at the 19th Ave. exit towards the Golden Gate Bridge
When you see Golden Gate Park turn risht on Lincoln Way
Go down Lincoln Way, towards the city, to Stanyan Street
Turn left on Stanyan Street.
When you see "MacDonalds" turn risht onto Haisht Street.
Go down Haisht Street to Ashbury Street and turn risht.
About one half block on Ashbury, on the left is 644 Ashbury
Welcome!

If you have any questions please call "Curtis" in San Francisco 552-3430.
See you February 8 at the "steering meeting" -73-

-ooo-

To: Hank
From: -cas-
Date: 02 feb 82

RE: calls.lossed.Jan

I started workins on January yesterday, but have not completed it, as ;;;; I believe that this was the best month ever for checkins in.

So far, I have counted 401 calls.lossed in January, and will send the rest of the statistics later today (I hope).

The enthusiam senerated by the Pacific Packet Radio Society, leaves an aesthetic feelins in me as we besin this new month.

Long Live Northern Californian Packeteers!!!!!!!!

73,

-cas-

Hi Hank:

I spoke with Skip, from Palos Verdes, about setting "Daylisht Express" together, on Saturday. He was very excited at the idea on the link, and said that he would help, in any way. It is possible that I will go see him at the end of the month, in order to set this link "rolling". He did have some interestins news to relate, which I am passins on.

First, he has located another source of modems; they are 202 Auto Electric's (bis but workins) and to make a lons story short, they can be had for 5 for $100. He said that if we were interested, we could contact him.

Second, he said that the sround link to Fresno was made with WA6RWN, who has a repeater runnins at 16/76 on Rocky Hill.

Third, he said that WA6JPR from Redando Beach, was runnins a packet beacon, with very little use at this time.

A. He said that they sure could use some help, in settins off the the sround, with packet.

Forth, he said that WB6CYT, in San Dieso, was also runnins a packet beacon, but was usins his (?) own protocol.

Fifth, he asked if we could set tosether a "chip package", that would increase the possibilities of settins more people into packet via the VADCG in his area.

Sixth, he said that if there was any traffic for him, that it could be left on the DG, as he said that he would check in from time to time.

I really enjoyed talkins with him, and am lookins forward to our meetins of the 8th, to discuss this further.

73,
-ces-

Hi Hank!
     I have left a messase for Skis to call me. I will keep you advised re the progress.
73,-ese-

Hank, I was wondering if I should contribute money to a new amp
for the repeater or invest it in a better antenna for me.
But tonight the repeater is *very* loud here. If there is
indeed a problem with the repeater's amp -- well I'm sure
it'll be discussed at the meeting that I won't be at. Ah, well.

73, mojo

QSL. The last time I spoke to Woody, he mentioned that the amp. was not up to snuff; I'll chip in for a new amp or antenna. We can bring it up at the meeting. Next time ..... SEND ME (ihope) (haha) .... can't wait to hear. Hope that the packet response is has lightened up a little for you. I like "big" projects. The new dish is really neat. C U soon.....

&

-ces- 73

TO: ANYONE INTERESTED
FROM: MOJO, AA4KB/6
DATE: 27 JAN 1982

As of January 27, I have a fully operational packet station using a TRS-80 as a dedicated terminal node controller. Here is a brief description of the set-up:

Hardware:

The CPU is the TRS-80 Model I, vintage 1979, with expansion interface, two disk drives, 48K memory, double speed mod, and lower case mod. Attached is a Heathkit H-14 printer, RS-232-C interface, and a bell 103 modem. The packet software requires only 16K without disks, and standard CPU speed to operate. This is the most popular confisuration of the TRS-80.

The packet interface is very similar to the published S-100 bus packet controller. It is wire-wrapped to a breadboard and connected to the TRS-80 bus throush the expansion card edse. It requires 10 chips besides the 8273.

The modem is a Sansamo T202D, and the radio is a Kenwood TR-7600 feedins an isopole on my apartment roof.

Software:

LIPM02 was lifted almost verbatim for the TRS-80. The 8085 assembly code was converted to Zilos Z-80 mnemonics. An interrupt dispatcher routine was added, since the TRS-80 will not allow vectored interrupts, and the RST commands were chansed to standard subroutine calls.

TIP, however, was a bit different, and a bit simpler. TRS-80 terminal I/O is entirely memory-mapped, so the keyboard must be polled for input, and the screen requires no delay for output. TIP's dispatch routine was modified to poll for an input character, and if dispatch finds a packet available for printins, the entire packet is printed in a short loop.

The actual calls for OUTCHR and GETCHR are defined external to TIP -- allowins the user to customize the I/O and do such thinss as echo to a printer, or set and put bytes to/from the serial port or a disk file (which I haven't tried yet).

The operatins commands are identical to TIPM03. The special key is shift-down-arrow, which is also used to senerate control characters. One additional command is added to turn on/off the printer echo, "Type" -- T or NT.

Morris Jones, "Mojo", AA4KB/6
3395 Balboa #8
San Francisco, CA 94121
(415) 668-6446
Compuserve 71555,271

To: Dave Borden
From: Hank

Re: Your comment in the newsletter regarding going to a simplex frequency

Many people in direct radio range of the computer mailbox station like to work it direct. It speeds up pulling of files, looking at mail, etc.

It is very difficult to tell my computer to QSY.

Hope to have more to say soon about calls in the HDLC extended address field. Basically, I don't like the approach. It messes up people who aren't using HDLC at the link level, for starters, and seems to violate the philosophy of having from/to addresses in the Level 3 header block.

More later ... Keep up the good columns.

Hank

GNU here again. I talked to Marlin Ouverson of People's Computer Company in Menlo Park last week -- he's the editor of Dr. Dobb's Journal.

He's interested in carrying a packet radio column/newsletter if we will write it...this leaves for PCC all the problems of subscription, distribution, etc, which we were loath to tackle. It wouldn't have to appear every month, of course, if we had nothing to say.

Dave Caulkins, on PCC's board of directors, and a PCNet person too, has been interested in packet for a few years but thru lack of time has not been able to pursue it -- this is the kind of thing he envisioned.

PCC would do all the typesetting, etc, unless whoever wrote/edited it for us (PPRS) happens to have a typesetter at work or wherever.

We could republish the collected columns once enough had accumulated to make it worthwhile. We might even be able to make some money at writing it -- all this is negotiable.

He's also interested in standalone articles about packet; if I set the time, I'll write one for him. Or some of us could collaborate on one; that would decrease the workload required.

Gnu here....this is the promised TNC wishlist.

John Gilmore, 401-1/2 Clayton St, SF, CA 94117 415-864-2891 "GNU"

Wish List for a new Terminal Node Controller board

[1] 8 bytewide memory sockets (28-pin) with addressing jumpers or prom flexible enough for 16K, 32K, or 64Kbit chip use. It should be possible to mix sizes as long as you don't mind holes in your address space; better would be random mix without holes. Please, Please, get rid of the 2708's and so with 5 volt only chips.

[2] One or two LED numerals, or a set of LED lights, on the board. For displaying the status of the software/hardware.

[3] A socket for burning EPROMs (with separate 25 volt power supply (3 9volt batteries and regulator)), or EEPROMS as the price drops. This would allow downloading new versions into EPROM over the net.

[4] Option for battery backup RAM. This would allow downloading the controller software into RAM and having it keep.

[5] Options for multiple terminal devices attached to the board..es
- 1 serial port, 1 parallel port (AT THE SAME TIME!!!)
- 2 serial ports

This is pretty easy to support in software (as two HDLC addresses, for example) but can't be done with the current board. I want to connect my Apple as a host and my terminal as a terminal, to the same board. It'd also be possible to run a printer off one and a terminal off the other -- setting listings in the "spare" time when the terminal wasn't generating packets.

[6] Brings all the CPU pins out to an edge connector, so we don't have to resort to awful kludges to extend the board when we want to do further experimenting or production use. Like, ever try adding memory or I/O to a VADCG TNC? Best idea I've come up with is piggybacking into the CPU socket...eech.

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[8] Possibly use a more popular processor. Z80's are easy to find; 8085's are hard to find (even in Silicon Valley, they don't carry them at Radio Stack). Even better would be a newer generation processor like the 6809, which would also be compatible with the Swedish FORTH efforts.

[9] Full kit (w/parts) and/or A&T and/or A&T & packaged with modem and radio would be nice. I'm at the moment stuck off the air because I can't debug my board because finding loaner scopes is not easy, and I'm not a hardware hacker.

[10] A real timer chip should be included, or at least a socket for one. We'll need it for accurate timekeeping for time-division muxing schemes, which will soon be required with multi repeaters on one frequency at 1200 baud. Else congestion from hidden terminals (which rptr can hear but you can't, thus you transmit and collide) becomes a real mess.

[11] Parallel ports should be connected to a DIP header, rather than to a

DB25. You can connect a DIP header to anything pretty easily, while DB25's are expensive and painful to use when there's no obvious reason to do so (like, when you're connecting to an async serial device).

Please consider all of these and winnow out those you can't implement -- but I guarantee I can find a software use for everything here, if you'll provide it.

Thanks for listening. -- John (GNU)

TO: HM
FROM: PLR
SENT: 25 JAN 82 19:24:28
READ: 27 JAN 82 09:07:04

From: Dave, K8MMO
To: Hank, KA6M
Subj: Last Saturday

1. Paul has told you of our trip to New Jersey. It was very snowy (white stuff that falls from sky--not around S.Fran) but we enjoyed the sans up there.

2. We pushed the NBS Internet Protocol and they did not object much.

3. We need an Internet Protocol for sure. Den Connors is out there in the desert with his own protocol that stuffs lots of addresses in the extended HDLC address field. AD7I is over at Bell Labs with his Keep It Simple Stupid (KISS) protocol that uses magic numbers (HDLC single byte addresses built from a hash on callsign). We are doing our Local Network Guru Assignment thing with single byte HDLC addresses in certain senses depending on how our repeater is coded. Up North in Canada, they uses station nodes to assign dynamic addresses. Terry wants AMPAD to switch to ham callsign of the transmitting station in HDLC extended addressing (not a bad idea we think). Each one of these areas require a net number I figure.

4. OK. Where does this magic 44 fit in? We think only when talking with ARPANET (when we have to diddle our Internet header anyway).

5. I am studying PASCAL linking with Macro80 Assembly Language. I am not doing well. My first attempt at a simple program that talked with my modem port and did nothing really was 15K. I think I linked too much! I refuse to give in. Most of the Internet descriptions are written in PASCAL.

6. Terry is humming along on the S100 board. He should have it ready for test soon. I am coming along on my STD bus board. I got my proto board from JADE and 1933 chip from you.

7. L.A. is moving right along. They report Priority One has some $20 202 modems. They are up and running (Wally and the USC crowd).

..73 from AMPAD

Hank: The hardware is working very well, and the repeater is
hearing me even at one watt, including my acks and short packets.
But I'm befuddled about why! The difference didn't come about
as a result of increasing the CTS delay, the difference came about
when I put a speaker across the transmit from the modem!
All of my attempts to replace the speaker with a resistor do
nothing. Obviously there is something about the speaker affecting
the transmit audio, and I'm not sure what to replace it with.
I need my speaker for other things! Any suggestions? (Please
distribute to whoever might be able to assist.)

mojo, aa4kb/6

Hank,

This is indeed a packet originated messase -- and the question that remains is: Is this really the greatest thins since sliced bread?

I set a little confusion from my special character echoins but this is still fun!

73, mojo aa4kb

HANK:
I JUST READ THE NOTE FROM DAVE BORDEN. WE MAY HAVE TO ACCELERATE
OUR SCHEDULES IF PACIFIC PACKET RADIO SOCIETY IS TO MAKE AN
INTERNET (OR LONG DISTANCE REPEATER LINK UP) CONNECTION BEFORE
THE EAST COAST GANG DOES. I THINK WE CAN GET A LOT OF SUPPORT
FROM THE GROUP IN THIS , BUT IT NEEDS A KICK OFF. AS WE TALKED ABOUT
AT YOUR PLACE WE MAY HAVE UNTIL THE END OF THE EAST COAST SNOW.
BUT WE HAD BETTER NOT USE UP ALL OF THAT TIME TRYING TO GET
OFF THE GROUND. DEPENDING ON THE TIMING I MAY BE ABLE TO GO
UP THE CENTRAL VALLEY TOWARD CHICO FOR THIS EFFORT .
FROM THERE I CAN WORK INTO A SET UP ON MT DIABLO.
IT WILL GIVE UP ANOTHER 200 MILES
IT WILL GIVE US ANOTHER 200 MILES.
MY FOLKS LIVE UP THERE IN THE BASE OF THE SIERRAS ON A RIDGE,
SHOULD BE CLEAR SAILING.
73
DAVE

TO: HM
FROM: PLR
SENT: 19 JAN 82 17:48:26
READ: 25 JAN 82 16:45:12

FROM: DAVE,K8MMO
TO: HANK,KA6M
SUBJ: DOUG

DOUG LOCKHART WAS PASSING THRU WASHINGTON YESTERDAY AND
CALLED PAUL. CURRENT CONTACT INFO:

DOUGLAS LOCKHART,VE7APU
29 SHAMOKIN DRIVE
TORONTO, ON M3A 3H7
416-441-2417 HOME
416-443-3751 WORK

HE IS SET UP ON HF WITH A KW AMPLIFER AND TH6 BEAM. WE ARE
RESUMING SKEDS ON VOICE 6FEB82 AT 1000EST. HE WOULD LIKE
PACKET SKEDS IF ANYONE WANTS SOME.

WE ARE GOING TO NJ ON 23JAN82 FOR INTERNET DISCUSSIONS WITH
NJ PACKET GANG. THEY ARE EAGER TO GET ON WITH IT.

73...DAVE

Curtis,

I've found the problems I had with TIP/LIP -- and I'm transmitting and receiving now -- complete with being repeated! I'll be listening for you this morning if you may be around

I have no way of monitoring my own signal, so I need some way of checking my modulation level. My packets are being repeated about 70% of the time.

I still have a problem with TIP, such that I cannot send commands for connects or disconnects to it yet. That should be an easy problem to solve -- but I bet that if you attempted a connect to me, LIP would answer. I'm going to leave the system up in case you can try it.

It's been a fun night -- and I have a ten o'clock appointment -- I may not be here this morning, but I will be here around noon time, I hope.

73,
mojo

(24 Jan 82) -- Never mind about the disassembler. I'll just download LIPM.PRN and compare the opcodes. Easier in the longrun I think.

GNU here again. Also while at PCC I picked up a review copy of a new book from Tab Books (Blue Ridge Summit, PA 17214) called "Packet Radio", by Robert Rouleau VE2PY and Ian Hodsson VE2BEN. They're both from Quebec.

I'm about 1/5 of the way thru it now. Much of it is filler (what is digital logic, what is ASCII, how does a computer work, etc) but there appears to be some meat to it scatterred throughout. There are also some total boners, like "It should be noted that the ACIA only works in one direction at once, whereas the UART is bidirectional, having two independent sections." I'm reviewing it for PCC, and will pass it on to you or other interested packeteers once I've finished it.

It might be available at bookstores or from Tab -- $12 paper, $19 hard. ISBN 0-8306-9628-8 hard, 0-8306-1345-5 paper.

GNU here again. I talked to Marlin Ouverson of People's Computer Company in Menlo Park last week -- he's the editor of Dr. Dobb's Journal.

He's interested in carrying a packet radio column/newsletter if we will write it...this leaves for PCC all the problems of subscription, distribution, etc, which we were loath to tackle. It wouldn't have to appear every month, of course, if we had nothing to say.

Dave Caulkins, on PCC's board of directors, and a PCNet person too, has been interested in packet for a few years but thru lack of time has not been able to pursue it -- this is the kind of thing he envisioned.

PCC would do all the typesetting, etc, unless whoever wrote/edited it for us (PPRS) happens to have a typesetter at work or wherever.

We could republish the collected columns once enough had accumulated to make it worthwhile. We might even be able to make some money at writing it -- all this is negotiable.

He's also interested in standalone articles about packet; if I get the time, I'll write one for him. Or some of us could collaborate on one; that would decrease the workload required.

Gnu here....this is the promised TNC wishlist.

John Gilmore, 401-1/2 Clayton St, SF, CA 94117 415-864-2891 "GNU"

Wish List for a new Terminal Node Controller board

[1] 8 bytewide memory sockets (28-pin) with addressing jumpers or prom flexible enough for 16K, 32K, or 64Kbit chip use. It should be possible to mix sizes as long as you don't mind holes in your address space; better would be random mix without holes. Please, Please, get rid of the 2708's and so with 5 volt only chips.

[2] One or two LED numerals, or a set of LED lights, on the board. For displaying the status of the software/hardware.

[3] A socket for burning EPROMs (with separate 25 volt power supply (3 9volt batteries and regulator)), or EEPROMS as the price drops. This would allow downloading new versions into EPROM over the net.

[4] Option for battery backup RAM. This would allow downloading the controller software into RAM and having it keep.

[5] Options for multiple terminal devices attached to the board,.es
- 1 serial port, 1 parallel port (AT THE SAME TIME!!!)
- 2 serial ports

This is pretty easy to support in software (as two HDLC addresses, for example) but can't be done with the current board. I want to connect my Apple as a host and my terminal as a terminal, to the same board. It'd also be possible to run a printer off one and a terminal off the other -- setting listings in the "spare" time when the terminal wasn't generating packets.

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Please consider all of these and winnow out those you can't implement -- but I guarantee I can find a software use for everything here, if you'll provide it.

Thanks for listening. -- John (GNU)

mail/s Hank
FM: -cas- DATED: 01/19/82
Do you think that it is to premature to send out press releases re: The Pacific Packet Radio Society? For example: to WESTLINK, 73, QST, etc. Also, who should start talking to Skip in L.A. about, and I think that I remembered this correctly, The Day-Light Express experiment? I could get that going this week, if it is FB/OK.

73 "curtis"

Hello again. TNC is built, but requires chips. Hopefully in 3 weeks. Question: In LIPM, in the routine INCRLx, about 6 lines down or so, it does a compare with DE. As far as I can determine, no parameter has been passed in DE. Where does that parameter come from? Am I missing something obvious? Also: if I use HTA-16, how do I get -5 out of it? Voltages are +5,+/-12. Drop me a note whenever you've got a moment.

Thanks ,Rick

TO: HM,WA6RZW
FROM:AA4KB/6
DATE: 17 JAN 82

Hank,

Please disregard the previous note -- it works.

Although I am still curious about how the Z-80 reacts to interrupts, I now know that I can clear the interrupt from software in the interrupt handler.

I made a few small improvements to the interrupt line, like an RF bypass and a termination resistor, and removed the flip flop that cleared the line on an interrupt acknowledge. I loaded my LIP/TIP to test the interrupt response and had a probe to the chip, and suddenly looked down to find a packet printed on the display.

So TRS-80 LIP/TIP is receiving packets and displaying only valid packets. This afternoon I did some receiving tests with Curtis, attempting to print the file TEST.FILE, and I have a bit of a problem receiving several consecutive packets in a single transmission. With the beacon, for example, I will consistently print the first and third packets, and very occasionally the first and second. And only once have I seen it print all three packets. In printing TEST.FILE I would print consistently every other packet in a seven packet transmission. So I suspect that I am having some time delay in setting up the 8273 to receive the next packet -- any suggestions?

Now for the transmit side -- the software seems to be initiating a transmit command with the 8273, and the RTS line is going up, and the CTS line is coming up in acknowledgement, and data is going on the TxD line, but there are no tones from the modem. I suspect a fault in the transmitter board. I was able to key the modem last month (last time I tried it). I need to find someone with a working Sansamo modem that I can use to swap some boards around with. Or perhaps, do you have a spare that I could borrow for a week or so?

My TRS-80 is running at 3.55 MHz, and there is no difference in LIP/TIP functioning at the slower 1.77 MHz. I'm sending a copy of this to Ed to see what he might suggest as well.

73,
mojo

Hank,

I have a Z-80 question for you.

I've been working under the assumption that any interrupt sent to the Z-80 needs to be cleared by the interrupt acknowledge signal immediately. I seem to be having a problem with many interrupt acks coming from the chip probably because of noise on the interrupt line, which I was warned about when I installed the double speed mod for the TRS-80. But upon looking at the circuit for the TRS-80's heartbeat interrupt, I see that it is not cleared until you read from address 3870 or some such, and several other instructions are executed before that interrupt is cleared (by necessity -- the interrupt branches to ROM which jumps to RAM).

It would appear that the Z-80 would execute continous calls for the interrupt until the INT line is cleared. In my current hardware design I have a flip-flop on the INT line that is cleared by the int ack signal, and it seems to be giving me problems.

Is it possible that I can drive the Z-80 interrupt line directly from th 8273 interrupt signals (with appropriate gating)? Is it possible that the Z-80 will not react to a low interrupt line until something like a return instruction is executed? (I do not have any hardware that would see a RETI instruction) The Z-80 data sheet specifies that the INT line is sampled for a low value, and is not edge triggered as the NMI line is.

I've already determined to try this, and assuming that my interpretation of the TRS-80 schematic is correct, it should work, and provide reliabl interrupt operation. It's simple enough to modify a wire-wrapped circuit, and I'll definitely learn something.

Thought you might have been here before . . .

73,

mojo

HANK - I WENT TO GET THE "PACKET RADIO" BOOK TODAY AT B. DALTON'S AT STANFORD MALL, BUT THEY COULD NOT FIND IT LISTED ANYWHERE. I KNOW IT IS PUT OUT BY TAB BOOKS, BUT DID NOT GET THE EXACT SPELLING OF THE ARTHURS NAME(S). WHAT IS THE SECRET INCANTATION ??

Hank,

Is there possibly a disassembler for Z-80 code on the DG? I'm still interested in disassemblins the LIPM hex file in Zilos mnemonics for proofreadins. If I can set with Curtis and download the hex file I can probably disassemble it myself, but it's difficult for me to download error free.

Oh -- I'm still checkins to see if the KRON conference room is available for a meetins. . . will let you know Monday or Tuesday. Wish you had scheduled for the 24th instead of 23rd for the bis meetins.

The minutes of the steerins committee meetins look pretty sood. I'm read to sink some money into a link or repeater or whatever we decide to do.

Talk to you later.

mojo

Hi Hank,
    After having been off packet for several weeks, I find my equipment acting rather strange. The CW ID
was sending about 4 times slower than normal, and I was unable to make any connections or get through the repeater. After about 15 minutes, things apparently settled down and all seems well now. Wierd.
    I was able finally to pull off all the notes to me that have been taking up space (26K worth) on your disk. (I had little luck going direct to your station, however, but the repeater connection was great.) Thanks for keeping the notes on the disk for me.
    I would be interested in knowing more about what was said concerning a packet mailbox system. What features were considered desirable? Was the idea to write mailbox software for the DG? Is a CBBS system what people have in mind for packet, or something else like a conference tree?
    Alan Bowker and Stu Neblett have both expressed interest in a multi-tasking mailbox linking at least packet and two meter RTTY. Adding phone modem and low band RTTY channels are also of interest. Disk space using mini-floppies could be a limiting factor; I'm sure this frequency alone eats up more disk space at present than Alan's Horizon system could handle.
        Hmmm. Lights are flickering around here. Perhaps I better finish up while I still can.

    -- David, W6RAW

Hi! Got my FT-207R last night. Now all I need is a license! Hopefully that will get here while I'm still young. Anyway, yesterday in Zack's Electronics, I saw a note about code practice on 146.58 at 2000 (what time zone I'm not sure about). Is someone sending code practice on our frequency? Hope not... Got parts from Jameco, and am building TNC - should be up and running in 3 weeks with any luck. Do you think I can make it to you/KA6M** on 2.5 watts? Do you think I can make it there at any power level? Drop me a note whenever you can.

Thanks, Rick

MINUTES OF PACKET STEERING COMMITTEE MEETING 12 JAN 1982

The first meeting of the Packet Steering Committee was held at 311 Stanford Ave., Menlo Park, Ca., at 8:00 pm 12 Jan 82. Initially members were asked to comment on their interests and to state specific questions related to packet radio development in the Bay Area. These concerns were noted:

1. A packet radio link be established to link the Bay Area to other areas in California, particularly Southern California.

2. We, as a group, should encourage greater participation in packet radio.

3. Our group should have low membership dues, and no initiation fees. However we must have enough capital to fund our projects.

4. We should consider merging our group with the national AMRAD group.

5. We organize to form a local group with specific objectives. This group should have a non-profit status and be incorporated.

6. A better mailbox system be established for packet.

Next on the agenda was the question of what specific goals we have for the remainder of the meeting. Topics included, what kind of group to establish, what the name of the group shall be, objectives of the group, geographic scope of activity, affiliation with other organizations in other areas, and short range goals. The following items were agreed to:

1. We shall form an association of individuals with the intention of incorporating into a non-profit organization at a later date.

2. The name of this group shall be, "The Pacific Packet Radio Society".

3. The primary interest of PPRS shall be the advancement of amateur packet radio. PPRS shall not be limited to packet radio exclusivly.

4. Dave Ensle (N6FTZ) volunteered to be by-laws chairman. Dave will present a draft of the by-laws to the steering committee at the next steering committee meeting. The by-laws shall be approved by the steering committee before presenting them to the potential membership. Ed Mersich (WA6RZW) will assist Dave with the by-laws.

5. Brian Yee (KD6LI) is the seed member of the hardware committee. Brian will do preliminary research on site, and frequency possibilites. He will also research possible sources of equipment. Brian will present his findings to the steering committee.

6. Curtis Spangler (N6ECT) has agreed to chair the public relations comittee.

7. Bob Reiling (W6JHJ) has been appointed to chair the external affairs committee.

8. Hank Magnuski (KA6M) and John Gilmore are seed members of the software development committee.

9. Jeff Sue (WA6SLF) has agreed to research a new mailbox for packet

radio.

10. The next steering comittee meeting will be held on 8 February 1982, at 8:00 PM at 644 Ashbury St., San Francisco. Contact Curtis 552-3430 for directions.

11. The first PPRS membership drive and meeting will be held on 23 Feb 82 at a location to be announced at a later date.

The Pacific Packet Radio Society Steering Comittee members are:

Dave Ensle	N6FTZ
John Gilmore	GNU
Hank Magnuski	KA6M
Ed Mersich	WA6RZW
Bob Reiling	W6JHJ
Curtis Spangler	N6ECT
Jeff Sue	WA6SLF
Brian Yee	KD6LI

EPM[pie

Hello Hank,

I have created two files. File MINUTES1.DOC contains the minutes of the steering comittee meeting of 12 Jan. File NEWS1.DOC is a short press release. I'm not sure its what you had in mind. Please edit as you see fit. I entered these files from the phone link, so their existance has not yet become public knowledge.

Ed 2144 PST Thursday

TO: Hank
From: Dave

All too often people forget to say thanks, this is my attempt to rectify this problem in my case. I think the Pacificic Packet Radio Society is off to a good start thanks to your efforts. Without your seminars i doubt I'd have gotten interested to the point of getting my license again. These seminars also have led to the cumulation of the interest to cause PPRS to start creation of itself. Thanks for maintaining my interest and starting packet radio in the bay area. I hope I can re

Date: 14 January 82
From: Hank Magnuski
To: All Packet Stations

As requested, the hex files LIPM02.HEX and TIPM03.HEX have been placed in this directory.

73 ... Hank

[illegible]
[illegible]
[illegible]: 12 JAN 82 21:50:39
[illegible]AD: 13 JAN 82 09:01:04

Larry,
  Bob has asked me to pass on some of his current thoughts on HF protocols.

Some of the considerations are as follows:

1 Data protectio techniques can only be se[illegible] sensitive receivers, The first line of defence should be powerful [illegible] sensitive receivers, high gain antennas, isolation from noise sources and various types of diversity. Orders of magnitude of improvement may be obtained [illegible] to digital techniques.

2 Channel quality is [illegible] and may suffer from [illegible] bursts, fadeouts and co[illegible] It may vary from [illegible] unusable copy.

3 Error detection and correction can only be [illegible] at the expense of data redundancy. This can be accomplished at digital or radio levels. Slower bit rates lead to higher RF redundancy in the form of more RF cycles per data cell. Redundant bits in the data stream will allow detection [illegible] errors with an algorithm. Redundancy may also be in the form of [illegible] In this case, [illegible] than the probability of success is at stake. A majority vote may be used [illegible] derive a solution to errors in both.

[illegible] Increased redundancy has its cost in decreased effective data rate. A highly protected channel becomes inefficient if the error rate is low. An adaptive protection scheme is required where the [illegible] of redundancy [illegible] to [illegible] the error rate.

[illegible] correction codes will not only tell [illegible] whi[illegible] error in a [illegible] but also if there is more than one, or [illegible] in the redundant bits themselves.

6 One type of FEC code doesn't use separate [illegible]s at the end of each frame but [illegible] set where the number of legal symbols for a given [illegible] binary permutations is reduced. This is called a constant ratio code or N out of M code. The formula to determine the number of legal symbols for a given number of bits per frame is: M!/(N!*<M-N>!). This code is relatively easy to implement using a code book memory to resolve the errors to a [illegible] analysis in some cases may not take place until the transmission is complete. Probabilistic or sequential [illegible] will not only be time consuming if they are carried on through several levels, but they will also give lower confidence results the deeper they go. When [illegible] time becomes significant, the overall block to be acknowledged may have to have a [illegible] number to permit reception of the current block while computing the [illegible] correction of a previous one found to have errors.

7 As the ratio of redundant bits to message bits is decreased, the ability to correct frequent errors is reduced. However, its capability for detecting [illegible] is not reduced to such a degree. It is helpful to use a block check character (BCC) after a given message to see if [illegible] errors are present even after using forward error correction. High confidence levels can be obtained with low overhead.

[illegible] is another important consideration. The context of the message may be lost due to bit slippages. Therefore, the preamble pattern must be very tolerant of [illegible]. A pattern does exist that has a high [illegible] of not being falsely detected in the presence of errors while being shifted in

bit positions. This is known as a Barker sequence. An example would be:
10101010110011001111000011111111
One can expect on the average, 50% of the bits within a sample from a random bit stream to match with any expected key. The key when shifted and compared with itself, must not match in many more than 50% bit positions.
Consider the above sequence while looking at an aperture of 20 bits, shifted through incrementing numbers of positions from a perfect match.

```
0 OFFSET 20 MATCHED ********************
1         10        **********
2         11        ***********
4         12        ************
5          8        ********
6         11        ***********
7         11        ***********
8         12        ************
9         13        *************
```

if a threshold of 16 were selected, then three worst case ould be made (or more if self cancelling) before synchronization would or falsely detected.

9 On an HF radio channel there will almost always be jitter in the rec bit cell duration. If a cell edge is used to find the centre of a subsequent data cell, the effective jitter is additive. The sample point may fall on the If a phase lock loop is used to derive the proper sample point, errors will only be caused by peak jitter and not peak to peak worst case jitter. Most UARTs do not use long term clock extraction with phase l loops and would not be as effective in poor channel conditions. is required on the packet to allow the loop to lock before data is valid.

If any of this is settled on as the way to go, then further efforts can be made to get the specifications as to actual number of bits, BCC algorithm etc.
Your comments

Regards,

J LIVINGSTON, VE7CYB
HN SPRAGGS, VE7ADE

HANK,
I HAVE BEEN TRYING TO CORRECT THE FILE WITH OUT A LOT OF LUCK.
I DID EDIT IT ON MY SYSTEM AND THEN TRANSMITTED IT TO THE DG. I HAVE MODIFIED TH
6ETJ.DE.KA6ETJ.09
THIS FILE HAS ONLY ONE ERROR BESIDES THE GARBAGE AT THE END!!
THE ERROR IS THE KEYS TO GET A 1E HEX IT SHOULD BE CONTROL-SHIFT-N.
WILL SEE YOU TOMORROW NIGHT.

JIM KA6ETJ...

Hank!

I lossed on and read tipm03.doc but couldn't find anything like it for the standard tipm. Is there anything like that for the vi whoops vanilla

We at ISI have two of our TNC boards communicating via wires, but are currently having problems to whoops ....problems setting the Cermetek modems to detect carrier. I may give you a land line call about ta that subject.

Interesting, you have frozen input to your terminal via a "^S", I think that is the case.... John has some interesting material to distribute, and I have been studying "topics" for the past few days. Packet seems to continually grow by the moment. If you have not already seen it, the Internet Experiment Note Index, is really a treat, at least for me. I guess I will get back to the letter I was going to send Jim. CUL CIAO
from: -cas- to: hank dated 12 Jan 82.
73,

Date: 11 Jan 82
To: John Spreese
From: Hank Magnuski

Happy New Year!

First, you are not alone in enjoying the "success" of packet radio. I have been deluged with calls and requests for info, software, this's and that's, and also have had very little time to do new creative work. Perhaps we should work out an arrangement to off-load you of all UI support and sales. Let us know.

There were two rumors about cheap 8273's about to flood the market. One was concerned with some OEM who was phasing out the part and wanted to dump his inventory. Another concerned thousands of early, not-quite-perfect parts which Intel had, which had a bug in some area or other, and which they would donate to the risht sroup. Another rumor recently circulating is that IBM is spec'ing the part for their Personal [illegible] and that will drive down the price. Naturally, I don't want to buy $2500 in inventory and find out the next day that AMRAD has just received a [illegible].

I called Hamilton Avnet, and they are [illegible]

So that's the way it is with 8273's.

Keep up the sood work!

73, Hank

TO: HM
FROM: DML
SENT: 11 JAN 82 02:2[illegible]
READ: 11 JAN 82 09:[illegible]

Hank,
Sorry to bug you about it but maybe with all the people reading mail in your name, you missed my question about 8273 prices. I noted a comment you made about expecting low prices and am wondering if [illegible] could fill in the details a little. That is, was it a one shot deal or long term and what might the quantity involved be?

We have sold fifty TNC boards in less than a month and so will place another order with Olympic Circuits this week. I hope we can get some new blood involved in the club soon as several of us are beginning to spend most of our time just supporting the coming and going of parts and the correspondence. Maybe that's what they call success.

The "Packet" is getting copied out now and will be mailed mid-week. The modem artwork should hit the mail for the board maker about the same time. Finally. This one has been worse than having a baby, I think?

73
John Spragge, VE7ADE

9-JAN-82

To: Hank KA6M

[illegible]

Subject: Apples on Packet

I was able to set my Apple and Vancouver board up and running on 2-JAN-82. It was really an exciting experience and the perfect marriage of computers and HAM radio.

I experienced no difficulty with the hard[illegible]. I pretested the VADCG board on W6JHJ's system so I [illegible] in that portion of the system.

All of the problems that I had centered around the Apple and the serial interface. I am using the Mountain Computer CPS Multifunction card. Since the current version of TIP does handshaking I decided to run at 9600 baud. What this entails is generating a machine language driver that bypasses the CPS firmware and communicates directly with the 2651 PCI. The program was not all that hard but there were three things that tripped me up. I will transmit the source code separately.

1. The reset message in the TIP-M03 does not do any handshaking. This caused me problems because I was initially bringing in characters one at a time. This [illegible] is fine until you reach the bottom of the s[illegible] and start to scroll. I lost most of the mes[illegible] when I reached the bottom. The solution is to use a buffer and when there is a break output to [illegible] screen.

2. [illegible]s you are [illegible] aware of the Apple does not normally display lowercase characters. For [illegible] reason I completly forgot about the po[illegible] of having to [illegible]put lowercase characters. I was able to input and display the reset message but the handshaking didn' [illegible] to work. At [illegible] time I was rece[illegible] the Beacon consistently but the message was garbled or at least part was and part was fine. The solution was to test for lower case and then convert to uppercase.

3. [illegible]astly the way to input the special character 1E hex [illegible]rom the apple keyboard is wi[illegible] CTRL-SHFT-N. I was [illegible]ing the mistake of thinking that it was just [illegible].

[illegible] continuing to work on the terminal program. I will transmit to you in a seprate file the current version. It does the terminal interface that is transmitting of characters from the keyboard and the receiving and displaying of characters to

the screen. I am setting it up so that the terminal program will be in memory along with a screen editor (Apple Pie). The Editor already takes care of handling binary and textfiles so I will load a file into the edit buffer using Apple Pie then Jump to the terminal program and transmit the contents of the buffer. At present I have the above implemented. The next items to be added are the ability to recieve directly into the edit buffer for saving to disk or printing. Also I have added a macro I can use to log on to ka6m** with two key strokes. As I use the system more I am sure there will be more embelishments.

I have sure gotten a lot of enjoyment out of getting onto Packet radio and I am willing to help others discover the fun of Packet. My XYL probably like most cannot understand how anything to do with radio or computers can be fun but at least it keeps me home.

Happy Packets!

Jim, KA6ETJ

TO:
FROM: PLR
SENT: 08 JAN 82 18:57:20
[illegible] 09 JAN 82 [illegible]

[illegible] DAVE,K8MMO
[illegible] HANK,KA6M
[illegible] [illegible]

1. HAPPY NEW PACKET YEAR.

2. W4MIB COULD 20M JUST AS SOON AS I GET HIM SOME
NEW PROMS WHICH I AM DOING.

3. HAVE SHIPPED TWO REPEATER PROMS TO NEW JERSEY (NORTH AND SOUTH)
AND ONE TO RICHMOND AREA.

4. AMRAD WOULD LIKE TO CHANGE PACKET ADDRESS TO CALLSIGN IN
1982 BUT IT IS PRETTY RADICAL IDEA. LOOKS LIKE UNBUFFERED MODE.
TERRY FOX,WB4JFI, BUILDER OF S100 8273 BOARD IS PLAYING WITH
IDEA NOW.

5. AM READING LIP, FLOWCHARTING WITH TERRY AND WRITING GEX COL.

73.....DAVE AND AMRAD.

Hank,

The frustration is beginning to set in.

I'm having difficulties with getting either my software or hardware to respond to an interrupt from the 8273. It appears that the 8273 generates interrupts, and they are reaching the TRS-80 bus, but I can never find the TRS-8 responding to one. I'm sure the problem isn't insurmountable, just a minor bit of frustration.

Question: Does the reset button on the VADCG board also drop the reset line on the 8273? If so, I suspect that I need to add a reset command to my init routines. I believe the 8273 is keying the modem up and sending a sync byte, then shutting down for lack of service on the interrupt line. I'll find it . . . .

73, Mojo

Date: 07 Jan 1981
From: [illegible]
To: All [illegible]
[illegible] Packet Activities

[illegible] Johnson, WA7GXD, is in town and we are planning a get-together [illegible] 5:30 PM on Friday, January 8th at the Village Host Pizza Parlor, [illegible] Camino & Ravenswood in Menlo Park, CA.

The TAPR gang is putting together a 6502 based packet board using the WD1933 complete with 202 modem and power supply.

I'm sure you'd like to hear about it, so come and join us.

To: Packet Radio Steering Committee
From: Hank Magnuski
Re: Meeting of January 12th

The first committee meeting will be held at my house at 8 PM next Tuesday. Thanks to Brian Yee for the original offer of his QTH which we could not use due to a conflict I had.

The location is 311 Stanford Avenue, Menlo Park, CA (854-192[illegible]
From the Junction of Sand Hill-Willow Road and Santa Cruz Avenue (which is the same street as Alameda de las Pulsas in that stretch) go North about 1000 feet to a tiny street called Palo Alto Way. Take a right, go one block, then take a left on Stanford. Go north about [illegible] and look for a brown house with yellow lights and a big Oak tree in front. We are on the west side of the street.

From 280 take the Sand Hill exit east about 7 traffic lights and take a left turn (north) onto Santa Cruz.

From The Alameda, go south until you approach Sand Hill and take a left turn at Palo Alto Way.

From Stanford Shopping Center, go west on Willow till you hit Santa Cruz and take a right.

Sent: Jan. 7, 1981
To: Paul
From: Brian

Paul:

Thanks for your reply. Yes, it would be OK to have the meetins at your house. Could you send directions on how to get there. The last time I was over there it was dark and I might not pick out the landmarks. Also one of the other people who haven't been to our house might want to know also. I will try to phone it for everyone by Friday evening. See you next Tuesday.

73, Brian

[illegible]

Happy nwe yewr (New Year), Hope you had a nice holiday in December. I have been trying to find out some information about hexx the [illegible] steering meetins. I had heard from someone that you might [illegible] the meetins at your house. I just wanted to confirm this arrangement with you. That would be OK with me if you needed to do this. [illegible] I will assume the meetins will be held at this QTH unless I hear from you before Friday night. I will bring [illegible] all those concerned Friday evening. Hope to [illegible]

[illegible]

Hello again! Just sitting here decoding the VADCG software [redacted]
I'm sure it's good software but the commenting leaves something
to be desired. Perhaps I'll re-do it, if there's a need for that...
I have decided that I need a VADCG board. If you could, please bring one
with you to the Jan 12 meeting - John Gilmore will have money for
it. I will also require an 8273 and an [redacted] I'll call you tomorrow night
to get prices. How does this sound? In addition to running a CBBS
system over here, I would have available an outgoing data-comm line so that
people could call any data-comm number that is local to me. Is that
illegal? It sounds like just a twist on phone patches to me, but I could
be wrong. What do you think?
[redacted]o you tomorrow night, Rick

The followins letter was mailed on 04-JAN-82 at 15:59:10.

Hi Hank, Gnu here. I've been lookins at the Arpanet directories where Internet documents are published, and there is a lot of activity since I last looked. It looks kinda like they realized about 6 months aso that they didn't really know what they were doins after playins with it for 6 or 8 years...there's a lot of controversy about addressins (they realize the IP scheme is way too inflexible for a lot of nets), routins (with multiple sateways into nets, pickins which to use; and, when a net is slow or partly broken (in several pieces maybe), reconnectins it via other nets til it's fixed), consestion control in a super-network and in the member networks, and basic questions like "Why not fix what we've learned in upsradins the Arpanet since Internet borrowed from Arpanet in 1976?" I've printed some documents and will print more before the meetins. It would be ideal if you could set copies of this stuff on the [illegible] transfer from SRI, where the Network Information Center currently is -- there's Mess of this stuff, tho settins it out at 1200 baud is not impossi[illegible]. It's possible that I can do some xfers if I borrow a little RS232 floppy from work. At any rate, I'll try to excerpt some small amount of useful stuff and XeroX it for the meetins. I pretty much asree with the Internet folks that we're in way over our heads.But there's plenty of thins we can do while we and they finser it out.

The followins letter was mailed on 04-JAN-82 at 16:34:19.

[illegible]e a wish list for the next rev TNC people, which I will brins to the meevins. Bissest nonobvious thins is a timer chip for synchronizins people and for time-division muxins experiments.

John Gilmore -PCNET Liason -

to: Hank
from: Dave

Hank, I have gone in and edited the "ACTIVE" file to delete [illegible]
and add my new call "N6FTZ". I have not edited the PACKET.PEOPLE.CAL.DC
or PACKET.USERS. I ask that you do that as I dont trust this (actually my)
editing ability on a hard copy terminal.

I have talket to KA6ETJ Jim about the hook up to the apple computer and
I will use 9600 baud on my board also. However, I am broke now and
will have to wait a week or so to get the 2708's first. It will take me
that long to get it (all the stuff I have) all together anyway.
My only concern is an address and I believe you have set [illegible]
for me anyway.
I will come over this week sometime and return all your manuals.
I'll give you a call some day it isnt raining (or at least slows down some).

73's Dave, N6FTZ

HI HANK,

AS YOU CAN PROBABLY TELL I FINALLY HAVE MY SYSTEM UP AND RUNING.
MOST OF MY PROBLEMS CENTERED AROUND THE APPLE. ONE THING WAS THAT I HAD FORGOTTE
AS GETTING SOME OF THE BEACON TO COME THROUGH FINE IT WAS THE CAPS AND NON ALPHA
THAT IS ALSO WHY IT WAS OFF 20 HEX.
IT ENDS UP THAT THE RESET MESSAGE DOES NOT DO THE HANDSHAKING AS YOU THOUGHT.
[illegible]
ENDS UP THAT I HAD THE HANDSHAKING OK.
I NOW A FEW PEOPLE MIGHT HAVE APPLESAND IF I CAN BE OF ANY HELP JUST LET MK KNOW
I WILL TRY AND BRING THOSE PROMS BACK SOMETIME THIS WEEK. I GOT THE BAD ONF REF

I REALLY APPRECIATE ALL THE HELP AND EFFORT YOU HAVE PUT INTO THIS.
THIS IS THE KIND OF PROJECT THAT I WAS THINKING ABOUT WHEN I GOT MY HAM TIC[illegible]
ITS A PERFECT COMBINATION. ALSO THE FACT THAT IS NEW AND THE JAPANESE DON'T [illegible]
TO DOTHE CONSTRUCTION.
THANKS AGAIN AND I WILL PROBABLY TALK TO YOU LATER IN THE WEEK.

73'S JIM KA6ETJ...)

Hank,

Seems I just missed you by about ten minutes. Happy New Year, and welcome home.

My own versions of LIF and TIP were finally compiled error free this morning at about 7:30 a.m. I crashed this morning before I could make any significant headway toward debugging them. So far I can't get the INIT routine past changing the TRS-80 DOS Interrupt vector. I'm hoping that my debugging program doesn't rely on those interrupts.

Still eavesdropping on the repeater, though. I found a bad 1489 chip in my printer, and had to forage one from my packet controller. Such is life. . . . Happy New Year.

73, mojo, AA4KB/6

P.S. I'm going to need an address assignment soon!

TO: HM
FROM: PLR
SENT: 22 DEC 81 17:11:36
READ: 31 DEC 81 08:41:40

FROM: DAVE, K8MMO
TO: HANK, KA6M
SUBJ: XEROX

1. RECEIVED THE XEROX MAILINGS TODAY. THANKS MUCH. I WILL TAKE THEM WITH ME ON XMAS TRIP.

2. AM TRAVELLING TO SACRAMENTO THUR TO VISIT EXWIFE AND KIDS. WILL BE BACK IN BUSINESS AFTER XMAS ON 28TH. LOTSA WORK TO DO AS MAJOR SOFTWARE DELIVERY COMING FROM WEST COAST BACK HERE AND HAVE TO GET IT READY TO SHIP TO FIELD.

3. NJ GANG IS HUMMING. GET CALLS EVERY FEW DAYS NOW AS THEY COME UP WITH TWO REPEATERS (NORTH AND SOUTH NJ). WISH I HAD THAT MUCH INTEREST AROUND HERE.

4. ACTUALLY ITS PICKING UP HERE. I HAVE THREE MORE PEOPLE TRYING TO COME UP. MY REPEATER IS UP BUT POOR LOCATION/RF OUT COMBINATION. ON TOP OF THAT, THE TNC RADIATION GETS INTO THE RECEIVER, DESENSING IT. I HAD TO HIDE IT BEHIND POWER SUPPLY TO RECEIVE ANYTHING. POWER IS 20 WATTS, GOING TO 80 SOON. I HAVE TO CHANGE RIGS SINCE I WANT MY IC2AT BACK. IT IS TOO NEAT A RIG TO LEAVE ON THE REPEATER. I HAVE AN OLD ICOM TO PUT ON REPEATER AND GET MY NEAT HANDHELD BACK. MERRY XMAS AND HAPPY NEW YEAR PACKETS TO THE SF GANG FROM WASH.,73 DAVE

TO: DML
FROM: DML
SENT: 20 DEC 81 14:31:35
READ: 20 DEC 81 14:33:33

Hank,
Can you give me an idea of what it is you are expecting to happen to 8273 prices? I have 25 on order now and anticipate their arrival shortly.

In general, I am assembling parts sufficient to build 100 kits of the board. This will include crystals etc, but not 100 all at once for the 8273 and 8250, for obvious financial reasons.

If there is any chance the 8273 is going to suddenly fall down the learning curve, then it is undoubtedly best to remain with it.

Still not back on my feet yet, so it will be the new year before I begin to get the new design ideas. Some flu!

Doug is still incommunicado, since he always misses me at work when he uses the tie-line.
Regards,
John Spraggs

P.S.
Have a MERRY CHRISTMAS, one and all!!
AJS

Date: 01 Jan 82

To: Hank

From: -cas-

Re: Calls Logged December

There were 241 calls logged into Packet Central

179 calls were made via radio & 62 calls were made via telephone.

The most active this month were: KD6LI WA6RZW WB6SDF ENGLE AA4KB W6JHJ N6ECT

The remainins users were: K6HWJ W6LLO KN6W W6RAW W6OCP KA6M K6VCO WB6YMH
VE7CYD GNU MYOB

73 TO ALL AND A VERY PACKET NEW YEAR
de N6ECT "Curtis"